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The Urban Planning Development Control Tracking Model for Mvurwi Town, Zimbabwe: Case in E-Planning Via Geoinformatics

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Abstract

The urban planning system in Zimbabwe, long modelled along the British system and its spatial planning concepts, principles, processes and legislation, influences in shaping the spatial mapping of towns and cities and the overall built-in environment in the country. The study focuses on critically assessing the feasibility of utilising e-development control processes in tracking urban plans with a view to developing an e- development control model. The study assumes the following objectives: identifying underlying frameworks for development plans in Mvurwi; evaluating current development control practices in Mvurwi; assessing current methodologies used for development control processes in Mvurwi; and developing an e-development control model for Mvurwi. This study uses a transformative research paradigm and mixed methodological approach, with a sample size of 302 respondents from five classes of Mvurwi property owners. An inductive approach to research is employed using documentary analysis, questionnaire administration and key informant interviews as the research techniques. The research established that the Constitution of Zimbabwe 2013 Amendment (No 20) (Constitution) recognises devolution and decentralisation of state power and provides Mvurwi Town Council (MTC) constitutional protection. The Urban Councils Act regulates local

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authorities and urban settlements, and it addresses concerns relating to estate development and housing provision and construction. The study also found out that the current development control frameworks and planning services delivery positively correlate with each other (r =0.541, p of 0.000 significant at the 0.05 level). The research concludes on development of an e-development model which discovered the relationship between geoinformatics in e-planning and enhancement of the accurate information essential to development planning, monitoring and execution are part of the development control methods in Mvurwi. The study recommends that Zimbabwe local authorities should embrace the application of technology in all planning service for them to achieve efficiency and effectiveness in development control.

INTRODUCTION

Towns and cities of Zimbabwe have been shaped, in a large part, by the country's urban planning system that was modelled after the British system and its planning concepts, principles and regulations of spatial mapping (Mbiba, 2019). Most current urban planning procedures and policies (using drawing boards, spreadsheets and charts) are drawn in analogue forms of planning and monitoring. Bertule *et al.* (2018) observe that traditional ways of managing urban situations across the country, including monitoring, surveying, implementation and keeping land records, have not been successful over the years. The ineffectiveness and efficacy of conventional procedures have made development challenging and time-consuming (*ibid.*). Although urban planning, design and architectural fields have come to value information and communication technologies (ICTs), developing countries like Zimbabwe have been slow to adopt e-planning tools. The feasibility of using digital systems into urban planning procedures is not well understood and has been largely underexplored. Administrative development control, policy-making and plan implementation are all aided by having up-to-date and credible and scientific data and this is no different at the local authority level. Using Mvurwi as a case

study, the focus is to determine whether e-development control mechanisms are useful in the execution of urban plans.

In connection with the laying out of the land itself and any adjacent land, local authorities guarantee that there are adequate hygienic conditions, decent amenities and convenience. Local authorities in developed countries like Britain have historically prepared planning schemes (Agyemang and Morrison, 2018). Social reformers in the nineteenth century popularised the idea of excellent planning to alleviate urban issues and administrative axes like overpopulation, congestion, poverty, crime, poor health and high death rates. The mandate, established by legislation in 1909, that no building or construction shall occur without the permission of the local planning authority, is a vital component of development control. Development control arose as a tool for guiding construction to areas where it was and is needed, thanks to planning authorisation (Salter *et al.*, 2023) for these areas. In the 1947 British planning system (Dunnning *et al.*, 2002), the granting and denying of planning permission to regulate development took centre stage. As a result of the speculative property boom of the early 1970s (*ibid.*), development control, long considered the Cinderella of the profession, came under increased scrutiny. However, the system of by-law regulation under the Public Health Act that allowed for submission of plans for approval under the 1922 Interim Development Order, was the direct forerunner of the development control system.

Through a historical analysis of various countries in Asia, Africa and Latin America, Geda (2019) shows that these regions' urban centres are more the product of colonial history than of economic factors like those responsible for the growth of the capitalist society in the West. Colonial urban planners in Africa saw the continent as a place to put their knowledge to the test. The goal of colonial British planning was to plan suburban areas in an efficient and orderly manner (De Satgé and Watson, 2018). The parameters of colonial planning practice, set by concepts of the garden cities and Northern European planning ideologies early in the 20th century, were heavily influenced by garden suburbs. The African form and structure of colonial

towns emerged from the prioritisation of public health protection in town planning (Kithiia and Majambo, 2020).

Historically, the government's duty in urban land-use planning has been restricted to the implementation of development projects and the construction of infrastructure, such as slum removal (Peter and Yang, 2019). The Colonial Development and Welfare Act of 1940 for British colonies and the Fund for Economic and Social Development (FIDES), instituted in 1946 for French African colonies, both reflect post-World War Two shifts in thinking about the imperial role in colonial development and spatial planning (Tribe, 2018). In the wake of the British Town Planning Acts, numerous African nations enacted their own versions, such as Nigeria's 1946 Town Planning Ordinance (Njoh, 2009), Malawi's 1948 Town Planning Act (Minyoi, 2019, Woudstra, 2020), Tanzania's Town Planning Ordinance, 1956 (Omunga, 2020) and Uganda's 1948 Town Planning Ordinance (Barugahare, 2019). Ayambire *et al.* (2019) note that such laws advocated the use of master plans and rationalist planning principles.

After the colonial authority left, the newly independent nations took possession of the cities and towns they had previously occupied (Beeckmans, 2018). The former African colonies have left relatively substantial residual legacies of planning that have been implemented to an extent in the present day. What kind of colonial domination a region of Africa endured can be seen in its modern urban layout (Testa, 2019). A country whose planning traditions have been carried forward into the present day is Zimbabwe (Musavengane, 2018). Zimbabwe's method of urban planning is based on the British method. British colonial rule in the Southern Africa meant that British planning ideas, principles and regulations impacted on the development of towns and cities areas (Minyoi, 2019). Sanitary Boards were first established in 1892 to govern municipal districts in Zimbabwe and its by-laws and Public Health Ordinances formed the basis for the country's current planning system. With the passage of the first Town Planning Act in 1933, urban local authorities got the authority to prepare town planning schemes to direct and control land-use and other developments

in urban areas (Mbiba, 2019). The Regional and Town Country Planning Act (RTCP), which was repealed in 1945 and replaced by the 1976 Act, required local governments to draft plans for coordinated and orderly land subdivision to regulate developments to achieve the highest possible levels of efficiency, comfort and aesthetics (Muchadenyika, 2020).

Master and local plans are meant to direct and regulate construction under the RTCP Act of 1976 (reviewed and modified in 1996). This law succeeded the Act of 1945 (Chigudu and Chirisa, 2020). To modify a community's physical environment, this strategy focuses on the planned placement of land uses and infrastructure in relation to existing transportation nodes (Chigudu, 2021). The town planning (TP) schemes local planning authorities' powers to regulate various types of development which are acceptable in different zones (Chigudu and Chirisa, 2020).

Planning legislation in developing nations sometimes look to what has been done in a developed economy as a model (Barugahare, 2019). Whiteboards, spread sheets and charts are examples of analogue planning approaches which have been used and are still used in many urban planning procedures (Wotler, 2018). Traditional techniques of monitoring, surveying, implementing and collecting land records are inefficient tools for regulating development in the current global urban scenario (Minyoi, 2019). There is little information on how digital systems implementation of urban planning processes could be done in developing countries like Zimbabwe (Karakadzai *et al.*, 2023) even though ITC systems have revolutionised urban planning globally. An information system, it would appear, not limited only to storing and displaying data relevant to planning use for the purpose of administrative tasks, must be created also to simplify planning at the decision-making level. As such, it is crucial to examine the potential of employing e-development control methods in driving forward Mvurwi's urban plans.

Nyadombo (2018) argues that development control approaches are crucial for monitoring urban plan implementation. There is

information asymmetry in that digital systems implementation of urban planning processes could be put in place in developing countries like Zimbabwe (Chigudu, 2021). This situation still obtains, notwithstanding the fact that the advent of ICT systems has changed the way urban planning processes are done across the world. Plan tracking is the most common academic framework for understanding how cities develop plans, although it has received little empirical scrutiny in Zimbabwe (Huang *et al.*, 2022). Human Resources and Financial Departments of local authorities are early adopters of digital technologies, but Planning Departments are far further behind. This study is an attempt to fill that need. Therefore, the goal of this study is to ascertain how practical it would be to use an online procedure to monitor and regulate building projects in densely populated locations. This study uses Mvurwi as a case study to achieve its goals.

This research is aimed at assessing the feasibility of utilising the e-development control process in tracking urban plans with a bid to develop an e-development control model. The research purpose is to determine if the e-development control technique can be successfully applied to the execution of urban spatial planning. While the development control concept is not novel in Zimbabwe, few studies have looked into how ICTs could facilitate the move from a manual to an electronic approach for development control. The literature on development control has concentrated mostly on analysing the status and efficacy of the development control system in Zimbabwe, but there has been very little analysis of utilising the e-process in the development control process, and this is the research gap that this study seeks to fill. Better integration of ICT into phases and procedures of development control requires a re-organisation of urban planning processes. Similarly, the results were evaluated on how useful they would be in developing an e-development model for Mvurwi. Considering the declining capacity of local authorities and sub-development control agencies to oversee and track the development control process, e-development control has become crucial. The need for scalable solutions is greater than ever and this research will help immensely in that regard.

European settlers constructed commercial properties and mines in the Mazowe District of colonial Zimbabwe between 1890 and 1930 (Shonhe, 2018), marking the beginning of commercialisation in the Mvurwi Farming Area. Large-scale commercial farmers, along with their network of input suppliers, transporters and other service providers, spurred the growth of Mvurwi town. A spatial map of Mvurwi locality is shown below.
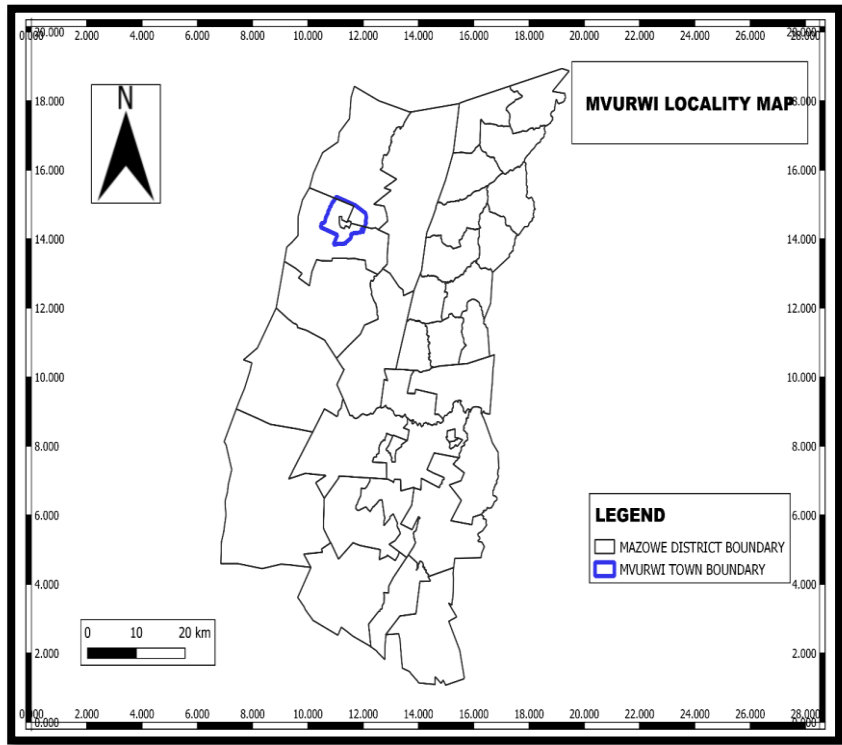

Figure 1: *Study Area* (Authors, 2024).

Before land reform, the population of Mvurwi town was believed to be around 2 000. However, according to the ZIMSTAT Census Report, (2022), the town's population had increased sharply to 15 645. Before land reform, it served primarily as a farm worker settlement, a dormitory town giving labour to surrounding

large-scale white properties. It had a tiny business centre with a few shops, service providers and government offices. During colonial times, a settlement compound called Suwoguru was built. Originally, Mvurwi's white business and farming community provided their supervisors and clerical employees with pole and dagga buildings for housing. White business owners, managers and government personnel all opted to live outside of Mvurwi central business district (CBD) in gated communities with access to reliable electricity (Swinkels *et al.*, 2019).

CONCEPTUAL FRAMEWORK
In this section, the study summarises the findings of a variety of academic and professional authors in terms of empirical studies on e-development control approaches for implementing urban plans. In this section, the relevant literature considering the theory that provides the most compelling explanation for the issues at hand, is assessed. To synthesise the studies and find any remaining research gaps and lessons gained from previous experiences, the conceptual framework also compares studies, findings and statistics from other researchers. By reviewing the relevant research, urban planners can better anticipate how e-development control methods will be applied in practice.

The process of selecting the best uses for land in a specific area is called land-use planning, and geoinformatics is utilised in e-planning to support this process (Pan *et al.*, 2018). Maps, scenario analyses and encouraging public involvement in land-use planning are all possible with geographical information systems (GIS). As a result of the scientific use of geoinformatics, communities and the environment can benefit from better-informed and evidence-based decisions (Oluwatayo *et al.*, 2019). Geospatial technologies are used in the expanding field of e-planning to speed up planning procedures (Wellmann *et al.*, 2020). In e-planning, it can be used to help in things like data visualisation and analysis, information sharing and collaboration among stakeholders and decision-makers. Better information, tools and technology are available to planners, as a result, boosting the efficiency, efficacy and sustainability of planning processes (Afzalan and Muller, 2018). Mwaura and

Odera (2021) argue that the use of geoinformatics could enhance the efficiency and effectiveness of development management. Maps, environmental impact assessments, planning and zoning, regulatory monitoring and enforcement, and improved access to data and technology are all possible outcomes. The results for society and the planet could improve as a result.

The study's underpinning concepts, actors and systems are all embedded in the conceptual framework. The study's theoretical underpinnings are depicted in Figure 2.
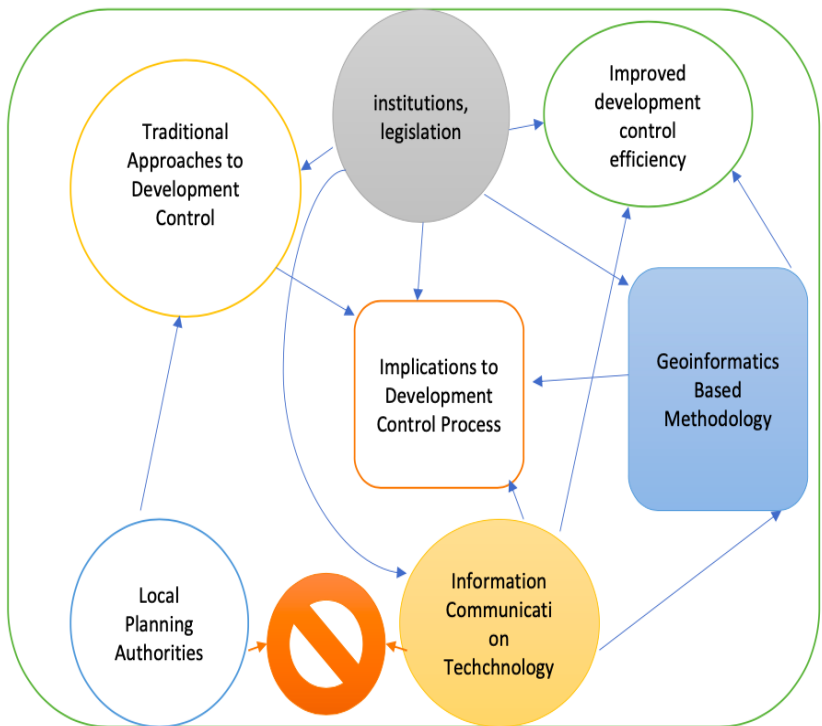

Figure 2: *The Study's Conceptual Framework* (Authors, 2024).

The current framework of urban planning and management theory and practice in Zimbabwe would be affected by the introduction of the development control system. Figure 2 shows

how inefficient planning is when local planning authorities stick to their tried-and-true methods for development control. Due to the present manual working practices, the development proposal is both time-consuming and costly (Garca *et al.*, 2019). There is little information on how far digital systems implementation of urban planning procedures could go, even though IT and communication systems have revolutionised urban planning processes around the world.

THEORETICAL FRAMEWORK

This section grounds the theoretical assumptions underpinning the study. The theoretical framework defines the direction of this research and provides a solid theoretical foundation for it. For the research purpose, the theoretical framework facilitates the stimulation, while ensuring knowledge expansion by providing both direction and impetus to the research inquiry.

SMART CITY THEORY

The concept of smart city is an innovative approach to fixing issues caused by rapid urbanisation. Yigitcanlar (2018) observes that

> "a smart city is a strategy to generate innovations using modern urban technology and practices to provide a sustainable environment for urban habitation in the future".

Ismagilova *et al.* (2018) argue that a city is a system of systems and that adding intelligence to pre-existing systems is all that is required to create a smart city. For a city to be considered "smart", it must have access to a variety of technology resources from a diverse range of business entities, all of that must work together to create innovative products for local consumers to buy. This idea uses past developments resulting from traffic flow patterns and wireless technology to precisely regulate factors, and thus individual choices, to construct intelligence in various sectors (Yeh, 2017). ICTs are emphasised in the "smart city" idea. This research finds that GIS and CAD ICT tools are natural extensions of the smart city concept.

There are three crucial strands enmeshed in the concept of a "smart city". These three elements consist of the community, its people and their technology (Allam and Newman, 2018).

However, the technology aspect of this research is more crucial in establishing whether or not the GIS-CAD base methodology for development control is feasible. When it comes to government, private and public needs, the technological aspect is directly proportional to the quality of information systems, especially those that combine telecommunication, computer and cutting-edge infrastructure (Nawari and Ravindran, 2019). An intelligent city is one which makes extensive use of technology to address urban issues and improve the lives of its residents. Prominent smart city experts and academic researchers have spent the past few years working to lay the groundwork for actual smart cities (Kumar *et al.*, 2020). Significant progress had been made in the world's most developed cities (Yeh, 2017). However, this novel idea still faces challenges in implementation in less-developed urban centres (Barns, 2018). Smart city models can be used to cities with a wide variety of social, economic and demographic characteristics. The Smart City Model cannot get off the ground without first doing a comprehensive analysis of existing success stories. Sustainable city development is made feasible by the integration, optimisation and management of urban resources and layout made possible by smart urban building. There are not enough resources, there is environmental contamination, there is not enough energy, there is not enough land, the population is growing and there is not enough transportation (Bibri, 2018).

INNOVATION DIFFUSION THEORY BY ROGER 1995

The concept was first introduced by Roger in 1995. Creativity, communication channels, time and social structure are the four determinants of an idea's dissemination, as proposed by the theory (Choe and Noh, 2018). Rogers (2003) identifies five phases that make up the diffusion process: awareness, influence, decision, action and verification. The theory focuses on how and why new ideas spread, or how adoption happens. Since the theory underlying this research is novel to Zimbabwe's planning system, it must cascade and be understood by practitioners and organisations not as a threat but as a way to strengthen development control procedures.

LITERATURE REVIEW

INSTRUMENTS USED IN DEVELOPMENT CONTROL IN ZIMBABWE

Urban planning relies on a solid legal foundation established by town planning laws (Jain *et al.*, 2019). A solid legal foundation allows for the management, planning and regulation of land development and other uses by local governments. Public planning is conducted through the legal system in the form of a body of laws known as planning law (Bäcklund *et al.*, 2018), with the purpose of advancing both public and private interests. Zimbabwe's post-independence urban character and organisation were set by colonial legislation and urban development policy. As a result, the urban morphology and the functioning of town development and urban administration systems were inherited from racially motivated urban settlement strategies (Chigudu, 2021). Ministerial directives, statutory instruments, government policy documents and Acts of Parliament make up the legal framework for urban land markets.

The Zimbabwe Constitution guarantees the sovereignty of state and local governments. Chapters 14 and 15 of the Constitution which provide for provincial/metropolitan councils, local authorities and traditional leaders, are based on the notion of devolution and decentralisation of state power enshrined in section 3(2)(i) thereof (Mironga and Namilonga, 2021). Section 5(c) of the Constitution describes local governments and provincial-metropolitan councils as constitutive of lower tiers or layers of governance, with councils representing and superintending over the urban and rural people's lives and issues. This provision lays the groundwork for articles 274:1 and 275:1 of the Constitution which provide councils the power to rule on their own initiative (Moyo and Motsi, 2023) and mandates that the State ensures public interaction. People should be, as stated in section 13:2 of the Constitution:

> "consulted in the formulation and implementation of master plans, local plans, town planning schemes and layout plans and other community development programmes that affect them".

Section 264(1) of Chapter 14 of the Constitution provides that,
"Governmental authority and responsibilities must be devolved whenever possible to lower ties of the government that are capable to carry out those responsibilities competently and effectively" (Mironga and Namilonga, 2021).

This lays the groundwork for devolution and, ultimately, provides local governments their own separate legal corporate institutional standing.

THE URBAN COUNCILS ACT (CAP 29:15)
The Urban Councils Act, as observed by Muchadenyika (2015), details the steps necessary to form and manage urban councils. It coordinates with relevant ministry efforts in the area to address housing construction and provision and estate development. The Act details how local governments can apply for and receive grants for urban renewal projects and how they should coordinate alongside the minister. Councils' authority to intensify and use finances/income in accordance with budgets established by the council determines the outline within which councils deliver services such as street lighting and housing, water and sanitation and hygiene, education and health (Chigudu, 2021).

THE HOUSING STANDARDS AND CONTROL ACT AND MODEL BUILDING BY-LAWS
These are devices for policy used to steer the development of housing complexes. Circular No. 70 of 2004 made changes to some of the previous rules that were widely regarded as excessively expensive (Muchadenyika, 2020). Collectively, these alterations allowed the government to deal with issues including poor building standards, overcrowding and the control of potentially harmful property use (along with the protection of adjacent property rights). Poorly constructed structures may be demolished (Mararike, 2019). It lays forth the required square footage and the council's authority to monitor construction and, in some cases, issue demolition orders. These two statutes, along with the RTCP Act, serve as a basis for the creation of council regulations. Basic health and safety criteria have been included. In housing requirements and planning to provide

higher-quality living spaces, however Muchadenyika (2020) claims, is not always the case in underdeveloped countries.

THE REGIONAL AND TOWN COUNTRY PLANNING ACT (1976 REVISED 1996).

The RTCP Act (1976) provides guidelines for land -use planning of areas like towns and cities, districts and others with an eye towards environmental protection and improvement, public health and safety, citizen convenience and cost-effective growth. Regional, master and municipal plans and the subdivision and consolidation of property parcels, are all authorised by the Act, as stated by Chigudu and Chirisa (2020). The main legislation is still heavily influenced by colonial standards for controlling and planning land usage, but it has been "softened" by subsidiary legislation like Statutory Instrument (SI) 216 of 1994, permitting service industry and special land-use activities to be accommodated in residential areas (change of use regulations).

DEVELOPMENT CONTROL PRACTICES

Current Zimbabwe development control methods are based on the RTCP Act, namely Section 24 (Matamanda, 2020). Section 24 of Part A of the Zoning Part describes the steps that must be performed to obtain development permission. Permit and preliminary planning applications must be filed to the local planning authority with all relevant information as specified in Part V, s26 of the RTCP Act (Chigudu and Chirisa, 2020). If the application is for a building project, the landowner's signature is required. The purpose of this method of development control is to ensure that the relevant decision-making body can accurately assess the significance of predicted results and the scope for modifying or mitigating them before a plan is approved (Yaakup *et al.*, 2018).

However, given the ever-changing nature of cities, it is more important than ever to have a well-designed information system that can monitor and supervise conformity with planning guidelines and serve as an early cautioning system for conflict and sources of deficit in urban planning and management (*ibid.*). Evaluation of the feasibility of planning ideas necessitates data from the relevant agencies (Geda, 2019). Table

1 summarises the features of the development information and control systems.

Table 1: *Development control procedure and purposes of information system* (Yaakup *et al.*,2018)

Step	Action	Purpose of Information system
Initial stage	Consultation with local authority regarding potential, planning requirements, policies involved in the site.	Data retrieval a. existing development b. development position, approval c. development plan d. planning policies
Planning Application Process	Registration • site visit • data collection from various departments planning • issues identification • technical report preparing • verification of application	Land identification for development policies translation formulated into spatial context development pressure area Identification
Technical Sub Committee	• appraisal technical requirements • the technical recommendation amendment to applicant	Data retrieval from various agencies able to facilitate technical evaluation
Town Planning Committee	• Formulisation and review of planning policies • planning application Consideration	Capability of analysing the development strategy • Provide information to evaluate the implication or planning application

METHODS AND TECHNIQUES USED FOR DEVELOPMENT CONTROL PROCESS

CONFORMANCE-BASED GIS METHOD

This technique evaluates the success of the plan's execution by conducting a compliance analysis. Three criteria are used in the conformance test approach to evaluate the plan's implementation (Rudolf and Grădinaru, 2019). The GIS parcel dataset and a defined area of the local plan are the focus of the compliance evaluation. Decision-makers now have a new tool for managing, analysing and presenting large amounts of data (Ali, 2020), thanks to advancements in computer processing of geographically referenced data made possible by GIS.

DOCUMENT ANALYSIS

Concurrently with the GIS and on-site inspection portions of the conformity test. The local plan and supporting documents are compared to data gathered during the site visit and the GIS portion of the compliance test to round out the evaluation criteria (Montella *et al.*, 2019). This method is effective at pinpointing spots where neighbourhood growth has diverged from the local plan. To guarantee that the generated product will be a substantial improvement for development in a particular local plan region, it is necessary to re-evaluate the secondary plans for the undeveloped and partially developed areas.

STAKEHOLDER ANALYSIS METHOD

Any programme, effort or development strategy is bound to have numerous important stakeholders. For the plan to be successful, it requires input from these parties. Those who stand to lose or gain from a development initiative are considered stakeholders (Barney, 2018). Therefore, it is generally recommended that all planning methods begin with a clear stakeholder analysis. Stakeholder analysis is used to identify potential risks, disputes and limits that may influence the intended programmes, initiatives or activities. Disadvantaged or marginalised groups, often left out of planning procedures, are candidates for future exploration and partnership (Stender and Walter, 2019). Various stakeholder analysis approaches can be used to identify stakeholders and determine the extent to which they should be included at various stages of the process. Consultations, focus groups and workshops come to mind for modest programmes and efforts (Treharne *et al.*, 2022). The planning or management team should use their best judgment to determine what is most appropriate, keeping in mind that the main purpose is to appropriately identify key stakeholders who may have a major interest in or authority to influence what is being planned.

SITE VISIT

When a location's exact coordinates could not be determined using GIS, an on-site visit was necessary to complete the conformity test and collect additional data.

TOOLS USED FOR DEVELOPMENT CONTROL PROCESS

ZONING

When it comes to managing growth, zoning is an essential tool. Land-use regulation tools like zoning allow for the separation and segregation of permitted land-uses within distinct zones, as described by Pantic *et al.* (2019). As stated by Memunatu (2015), the definition of zoning is:

> "The regulating by land use laws and(or) buildings, bulk factor and density of structures in prescribed areas for the purpose of securing the suitability, health, safety and general welfare of the community."

Gabbe (2019) is of the view that zoning regulations often include a wide variety of restrictions, such as the minimum criteria for building lines from roads, building heights and lot sizes, and the permitted and prohibited uses within certain regions. Economic studies of zoning, as cited by Pantic *et al.* (2019), establish three overarching goals for the imposition of limits. Zoning was created to limit these kinds of unintended consequences by physically segregating uses of property that otherwise do not get along.

ENFORCEMENT NOTICE

This applies to any case where development is carried out without proper planning authority (permission) in contravention of town planning law (Bakr *et al.*, 2018). A similar notice may be issued for the illegal demolition of a previously altered building or for its restoration. Contrary to popular belief, disobedience of an enforcement order for a breach of a planning legislation does not constitute a criminal offence.

FACTORS AFFECTING DEVELOPMENT CONTROL PROCESS

HUMAN AND TECHNICAL RESOURCES

Human, physical, financial, technological and economic resources are all examples of resources (Nascimento *et al.*, 2019) that are crucial for making the planning processes easier from the conceptual stage to the implementation stage. Adabre and Chan (2019) underscore the need for effective resource allocation as a key success element for local plan sustainability.

Due to the interdisciplinary character of planning, human resources are crucial, both in terms of sheer numbers and of having the right level of expertise in each relevant area. For instance, staffing levels may have a major bearing on whether problems identified by plans are resolved (Scerbo, 2018). More people working on plan processing means more potential for helping applicants succeed. Plan policies and related rules, application information, policy guidance and coordination with other public authorities responsible for permit approval, receive additional focus as capacity grows. Research shows that cities with trained planners who can cater for the plans to the requirements of their residents produce better local plans (Rudolf and Grădinaru, 2019).

LACK OF LONGITUDINAL DATA SETS AND AGREED UPON RESEARCH METHODS

Due to a lack of longitudinal data sets and well-established research approaches, studying the long-term consequences of planning is difficult (Ryan and D'Angelo, 2018). Successful and rigorous evaluation of planned implementation requires baseline data from which to detect and track change. This problem is made worse by the fact that different jurisdictions gather and analyse data in different ways.

With the advent of the information society and the production of superior, reasonably priced computers with data processing, it has become viable and practicable to compile, store, process and retrieve enormous data bases (Wang *et al.*, 2020). There has been a significant growth in the quantity of data collected on cities, providing numerous new perspectives on urban life and its inhabitants (Losavio *et al.*, 2018). Digital infrastructure, networks, gadgets, sensors and actuators have become more pervasive in modern cities. Thus, LPAs may better govern and regulate cities with the help of big data, integrated analyses and centralised command and control. Vlogman (2023) argues that without such scrutiny, future smart cities will be more likely to reflect the preferences of a minority of the population than the goals of corporations and governments. This breakthrough has led to stringent research procedures, enhanced decision-

making, thanks to more complete data and has completely altered the way policy analysis is conducted.

The credibility of evidence-based planning appears to be coming under increasing examination in light of research that has highlighted the limitations of the use of evidence in policy-making. Moving beyond the area of instrumental rationality and establishing a position based on two intellectual pillars require a review of the concepts that support the principles of evidence-based planning (Olszewska *et al.*, 2018).Nonetheless, a current problem in planning has emerged in light of a lack of comprehension, that Campos and Reich (2019) referred to as "new plan syndrome" (where new plans and policies are implemented without any attempt to assess the progress toward meeting the stated goals and objectives).

URBAN SYSTEM FACTORS.
Urban systems are open, complex and highly influenced by their surroundings. It is challenging to completely understand the non-linear interactions between these systems (Rus *et al.*, 2018). The systems often operate on the edge of chaos, but their self-regulatory interactions and the flexibility with which they can adjust to new circumstances allow them to persevere in the face of immense adversity. It is important to note that decisions made to implement the plan are impacted by dynamics inside the urban system. Given the complexity of the urban planning environment, delivering plan vision visions is a key governance problem (Nielsen *et al.*, 2019).

Since effective plan implementation requires a local, multi-perspective, participatory and iterative approach, decision-makers must understand and respect the connections that ultimately affect the process (Govindan and Bouzon, 2018). However, a systems approach that includes all actors is necessary for resolving urban challenges connected with combining different governance scales and institutions (Nieuwenhuis *et al.*, 2021). The likelihood of deviating from the plan is predicted to increase in response to market forces like population growth and rising living standards and to decrease in response to trends like decline or stability. Therefore, the

extent to which a local plan can be implemented, is dependent on the specifics of that plan's local context.

THE POTENTIAL OF GIS E-DEVELOPMENT CONTROL BASED METHODOLOGY

GIS has great relevance to development control in several ways. These ways include data management, data analysis.

Data Management
Digital maps, geographical data, attribute data and other forms of data are all linked to development control (Prasad *et al.*, 2018) and, therefore, it is important to keep that in mind. GIS software makes it possible to store, retrieve and display geographical data and attribute data. In addition, GIS may be utilised to perform impartial evaluations, track historical and ongoing data and visualise this information (Batty and Xie, 1994).

DATA ANALYSIS

If urban planners want to design and assess development choices, they need access to a tool that can collect, manipulate and analyse spatial data and GIS provides many of these functions (Densham, 1994). It is helpful for examining demographics, economics and the state of the law in the area. Because of the spatial nature of physical data, GIS technique is particularly useful for its analysis (Fischer *et al.*, 2019). As a result, GIS makes sense as an analytical tool for this investigation.

GLOBAL CONTEXT EXPERIENCES ON E-DEVELOPMENT CONTROL

As Mirzaei (2023) points out, the evolution of town planning in industrialised countries was predicated mostly on analogue operations which were intertwined with conventional methods and performed primarily by hand. An understanding of the dynamics of interrelationships between population and land-use is crucial for formulating effective strategies in light of the rapid acceleration of urbanisation around the world (Abkharima *et al.*, 2020). As computing technology and software advanced in the 1960s, new data management systems appeared in industrialised nations like Canada and the United States of

America (Abramova *et al.*, 2018). As a result of increasing institutional support, decreasing system costs and a plethora of planning applications, GIS is becoming increasingly commonplace in the planning processes of developed nations (Tomor *et al.*, 2019). Its widespread use in planning can be attributed to the phenomenal technical and commercial breakthroughs in the computer and GIS industries that made it possible for most planning agencies to obtain the necessary hardware for GIS deployment. E-planning, or the utilisation of modern information database-based tools such as websites, GIS and VR in urban renewal, is on the rise and should be seen as more than just a transition from manual system to digital planning systems; it is also a means by which the field of spatial planning is evolving from that of a mere physical planning specialist into one that emphasises participation, communication, efficiency and integration (*ibid.*). Twenty-four different government agencies in Malaysia use some kind of electronic database system that has made their planning more effective.

REGIONAL CONTEXT EXPERIENCES ON E-DEVELOPMENT CONTROL

The arrival of European settlers and the growth of large urban centres in Africa coincided with a period of controlled development. Until the development of GIS and remote sensing (Ajala *et al.* 2022), most African countries, such as Malawi, Nigeria, Uganda, Kenya and Zambia, relied entirely on analogue ways to monitor, enforce and manage physical expansion. Most African countries' central planning agencies still employ a time-consuming and inefficient manual system for filing, indexing and retrieving documents. All aspects of the development permit application procedures, including receipt and review of information, processing of fees and communication with applicants, are performed manually. Consequently, the system regularly brought about holdups, corruptions and laborious, time-consuming processes of categorising and retrieving application data. This arduous, time-consuming, costly and inefficient manual approach benefits no one (Patience and Abdurrahman, 2017; Patronal and Owen, 2021).

DEVELOPMENT CONTROL REVIEWED

Development control is an ancient approach in the field of town planning. There exists a huge corpus of research done on Africa and Zimbabwe's progress (Mlambo *et al.*, 2019). Corruption on the part of enforcing officials, the lengthy time it takes to complete construction of structures making monitoring of projects difficult and a lack of vehicles are all factors which have contributed to Tanzania's lack of development control, according to an analysis of country and town planning in Southern and Eastern Africa by Andreoni, (2017).

A United Nations study on urban environmental management and issues in Sub-Saharan Africa from 1996 found that planning and development control had not been effective for a variety of reasons. At the outset, in Africa, physical planning is considered a sectorial activity associated with construction, housing and local government (Cobbinah *et al.*, 2019). Ling (Year) argues that spatial planning should be incorporated into economic and social plans.

Minyoi (2019) studied development control in Zimbabwe in the context of applications and appeals for planning clearance from 1976-1996. He examines appeals lodged against planning permit applications in Zimbabwe with a view toward better understanding the laws governing development control policies and processes by which decisions are rendered. The legislative basis for development control has not changed significantly since 1976, thus it is hardly surprising that the system is being challenged in court (*ibid.*).

To investigate the challenges and constraints of the development control approach, Chigudu (2021) compared the case studies of Milton Park and Glen View 1. She argues that the development control mechanism in urban Zimbabwe is neither functional nor equitable because it has a solid legal foundation. She also notes that the applicable acts and by-laws are extremely detailed and explicit which works against development efforts. According to Chigudu (*ibid.*), the inherited nature of planning law is at the root of the problems with development control. That much has been said about

development control in Zimbabwe and Africa is inferable from the above.

Amid rapid urbanisation in Harare, Karakadzai *et al.* (2023) studied the extent to which new construction complied with local spatial plans. They found that there were discrepancies between the city's official plans and the reality of its streets and buildings, thanks to the manual nature of the development control process. This research, however, will focus on Mvurwi to evaluate the viability of employing an electronic development control approach to put urban planning into action.

RESEARCH METHODOLOGY
This section outlines the strategies and plans exploited to carry out this research and the reasoning behind those choices. The study's demographic, data samples and pilot study are all explained in the following section. This section further explains the methodology rationale used in this case study. Following this, challenges associated with gaining access to the population under research, data collection methods, procedures and the creation of an electronic development control model, are discussed. Next, the study looks at how the data was analysed and then wraps things up with some thoughts on how the study and its ethical implications stack up.

This research opted for a transformational research strategy since it was most suited to the research's objectives. The target population comprises 3 000 properties under MTC in Mazowe District. In the opinion of Ackerman. (2019), the term "target population" entails the explicit components or entities that have the data needed to answer and/or explore the defined research question.

The five different land uses within MTC served as the sampling frame for this research. Thirty-two homeowners were selected at random from the MTC Database. Table1 details the land use zones, number of properties and number of owners who were used to compile the sample for this study in MTC.

Table 2 details the land use zones, number of properties and number of owners who were used to compile the sample for this study in MTC.

Table 2: *Property land zones in Mvurwi* (Mvurwi Town Council database)

Property Land Uses Zones	Properties	Property owners	Population
Residential	2 632	2 615	2 615
Commercial	195	196	196
Industrial	120	120	120
Institutional	65	65	65
Recreational	5	5	5
Total	**3 017**	**3 000**	**3 000**

Table 3: *Number of Property owner sampled for -property land uses of Mvurwi Town Council* (Mvurwi Town Council database)

Property Land-lses Zones		Target	5% confidence level	Sample Size
Residential		2 615	261.5	262
Commercial		196	19.6	20
Industrial		120	12	12
Institutional		65	6.5	7
Recreational			0.5	1
		5		
Total		**3 000**	**300**	**302**

This research largely employed a mixed-methods strategy since it was planned that the early stages of fieldwork would serve to enlighten and enhance the earlier approach in terms of sample and areas of focus.

To assess the efficacy of development control frameworks and tools in Mvurwi town, the study used three procedures. The first step was a quantitative analysis of the local government's change of use data which revealed recurring trends in the way urban land is used. To qualitatively verify and evaluate the key urban development issues in the study locations, the data was used to build structured interview questions. The third segment featured geoinformatics-assisted quantitative and spatial

approaches for evaluating urban planning's concrete spatial goals. The case study's work breakdown structure comprises the following chronological stages: literature review; mapping; discussions with crucial stakeholders; land utilisation surveys; analyses evolving of land use; data analysis; report of findings; and construction of an electronic tracking model for development control. The research strategy was adjusted slightly to accommodate the research area and the categorisation of the strands of developments which were deliberated so that the final products were subsequent activities influenced by the previous ones, as shown below.

To discover illustrative movements in city development issues and spatial planning answers on a global, regional and local scale, a literature review on urban development administration and new town planning approaches was conducted. To rationalise the research, a methodological strategy was utilised in this section. Similar conceptual frameworks for the study were found in the literature which informed the methodology and research design used in the present investigation. The following were used extensively during the literature review process:

> Land-use records and town planning regulations relevant to the Mvurwi Town are examined and evaluated and the benefits and drawbacks of both historical and current development frameworks and practices discussed.

Information for this research was culled from books, websites and documents held by various government agencies. The strengths of town development management answers to difficulties, innovative and technical methods to town planning and markers for future research were the primary results of the literature evaluation.

To that purpose, key informant interviews were conducted with carefully selected parties. The ward development committee, local authorities, government agencies, planners and NGOs were the primary stakeholders consulted. A list of the stakeholders who were qualitatively consulted for the case study are found in Columns 1and 2 in Table 3.

Table 4: *Key Stakeholder Consultation* (Authors' 2024)

Stakeholder Group	Accessed persons/ professions	Collected data	Aim of Information and/Research Points Met
Mvurwi Town Council	Town Planner	Local plan map and documents	Base mapping data for evaluating development regulations.
		Mvurwi Town Council change of use register	Data for evaluating development control process.
		Application of e-planning and geoinformatics.	Evaluating level and understanding the importance of technology in town planning and development control practices.
		Application of e-development control model.	Evaluating level and understandings of the importance of technology in development control.
	Ward Councillor	Comments on development control methods and process.	Community leadership views and understanding of the development control and procedure.
		Community leadership views on development	View of local importance.
	Ward Development Committee	Community expectations through public involvement in planning and development.	In-depth exploration analysis of the local leadership on the importance of public involvement in planning and community development.
		Views on role of GIS in Planning	Local understanding of technology practice in communication, planning and development.

Government	d DSPD	Planning policy and guiding development frameworks/challenges and responses	An inquiry scrutiny of previous and existing town planning policies and the state's ability responds to the existing development control challenges.
		Enforcement of development control regulations	An assessment of efficiency of the state regulations in development management.
		Application of e-planning and geoinformatics.	Evaluating the level of understanding and views on importance of use of modern scientific methods in town planning.
Planning Practitioners	Private players	Scope of works in the development of Mvurwi Town.	Quality Assessment of development regulations and development instruments.
		Application of e-planning and geoinformatics.	Evaluating the importance of modern scientific methods in town planning

All of the interviews conducted by the study were face-to-face organised consultations. The interview schedule is included in the appendices of this study. Following are the five categories into which the most important information gleaned from the key informant interviews fall:

- Collecting primary information to utilise in assessing whether goals are being reached.
- Base mapping, land-use surveys and change assessments can all benefit from the spatial data collected for this study.
- Locating hotspots for the most pressing urban management problems and identifying them.
- Identifying future capability of the study for the quantitative measurable portion of the research.
- Analysing the degree to which present planning frameworks and methods meet the urgent requirements of emerging patterns in urbanisation.

The section focuses on developing common development control frameworks to spatially aggregate various datasets. In mapping of Mvurwi Town, it was simpler to construct because it was

based on local development plans and cadastral maps concepts already in existence, Due to the aggregation of most of the available data on zoning of land-use, ownership and occupancy of Mvurwi Town, current cadastral borders (individual stand boundaries), were chosen to be units for analysis in this study.

The study made use of hard copies of the current Mvurwi Town map to create a digital geo-database from during the first step in the preparation process. These copies were obtained from the office of the Surveyor-General. Due to the lack of digital mapping for the Mvurwi Town at the Surveyor-General Office and MTC, this exercise was necessary. The Surveyor-General's 1:5000 topo-cadastral maps which cover the heart of Mvurwi Town were purchased by the study in paper form. After scanning, the maps were stored using a high resolution (600dpi) JPEG format. The next step was mosaicking, an electronic technique of combining continuous images or map series. To begin, certain metadata scanned from the Surveyor-General's maps were cropped off, loaded with QGIS 3.22 software to produce a case study format file that is geo-referenced and then saved.

The second phase in the mapping activity was to overlay satellite images on the case study.mxd map file. The study collected satellite pictures from Google Earth-Pro, encompassing Mvurwi Town in 2020 and saved them in TIFF format. This was then followed by the insertion of these saved satellite images as raster layers to the mxd file. For the following reasons, the 60 researchers chose Google Earth-Pro images over alternative spatial data sources which are remote sensed: remote sensing data that is up to date is generally unavailable at Zimbabwe's local authorities and government offices and the majority of Mvurwi's current aerial imagery appears to be badly out-of-date, having been taken in the 1980s or earlier. Only private aerial survey businesses could provide these images and buying them cost a lot.

Google Earth-Pro outperformed other web-based remote sensing data providers like Google Maps and Yahoo Maps in terms of

spatial resolution. Before mosaicking the images, the study decided to download multiple pictures of various parts of Mvurwi Town because doing so provides an insight of the entire case study. The third step in base map creation required acquisition of hard copies of the proposed utilisation maps for Mvurwi local plan, encompassing Mvurwi. The suggestions maps were additionally scanned, mosaicked and geo-referenced before being placed as a raster layer to the mxd. map file. Figure3 depicts a summary of the base mapping process. The local plan study boundaries were integrated and digitised to generate the new boundaries of the study area.

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STEP 1
- Input : 1:50000
- STAGES: Scanning - Mosaicking - Geo-referencing
- Instruments: Scanner, QGIS111

STEP 2
- Data: Satellite photograph
- Stage: Downloading - Mosaicking - Geo-referencing
- Instruments: Google Earth, QGIS

STEP 3
- INPUTS: Local plan Layout plans
- Stages: Scanning - spatial referencing - Digitising
- Instruments: Scanner, QGIS
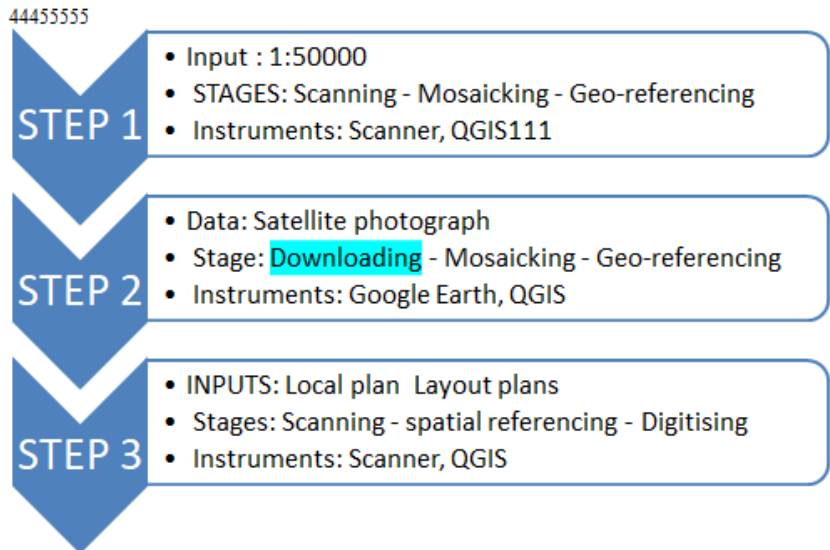
Figure 2: *The Process of Base Mapping for Mvurwi Town Council* (Mvurwi Base Map (mxd. file format))

The next step was to digitise land-use zones, reservations and planning boundaries proposed from Local Plan Map. These were then saved in shape file formats on the Mvurwi Town base map. This is illustrated Figure 4.
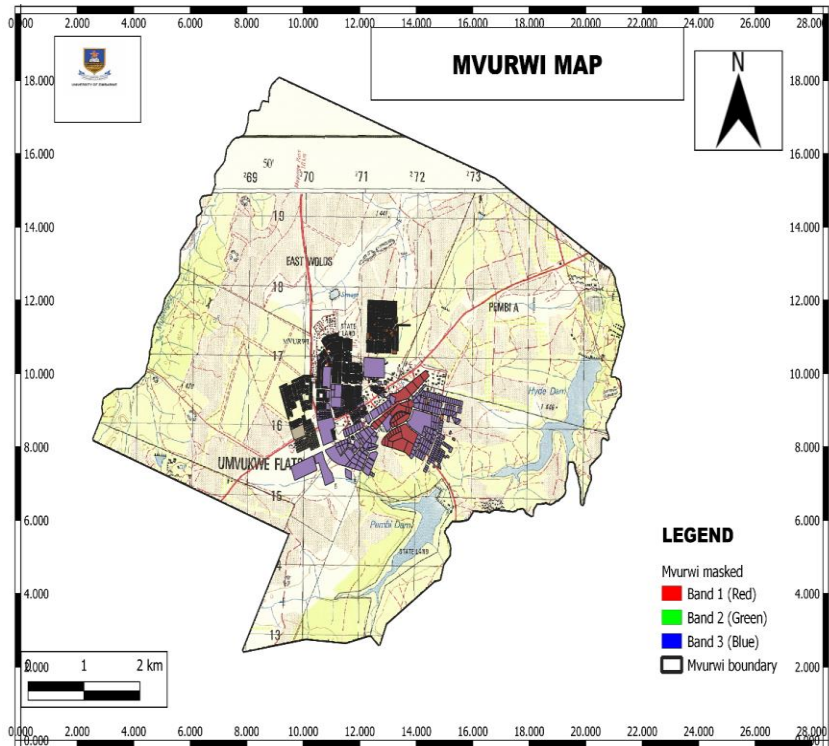
Figure 3: *Mvurwi Town Base Map* (Author, 2024)

URBAN GROWTH/CHANGE ANALYSES AND LAND-USE SURVEYS

The research made use of land utilisation and urban growth assessments in measuring and illustrating current spatial development outlines of Mvurwi Town's lack of responsiveness. The research made use of the Surveyor-General's topographical maps and existing layout plans in assessment of land-use change made to the current Mvurwi Town. In any analysis of urban growth, Moore *et al.*, (2018) allude that it can either be combined to span more expansive homogenous analysis zones or divided into individuals or families. Moore *et al.* (*ibid.*) went on to explain urban growth to be some patterns in an inert phenomenon yet being a procedure in active phenomenon. They further suggested that by employing these methods, a better

understanding of globe changes through urbanisation rates, regional patterns and expected growth, differentials and rising sprawls could be gained.

The research generated information through analysing data collected from key stakeholders was then utilised to pinpoint regions that are characterised largely by rapid change. The case study baseline map was then printed out and these regions were marked. The next step involved conducting initial land-use survey sampling using marked locations as the foundation. The study had two research assistants employed to help in land-use surveying in chosen areas. This exercise involved identification of all buildings in the selected areas based on stand numbers, numbers of storeys and type of activities carried out by the building's residents on each floor. The purpose of the exercise was also to obtain data regarding the delivery of outside services.

The preliminary physical survey results were analysed and this resulted in larger stand blocks being established for more thorough studying of land-use change. This was accomplished by choosing blocks with structures that displayed a larger variety of land-uses. As a result of full development being achieved in the area, these preliminary land-use survey demonstrated lack of significant lateral spatial, in essence, this causing some noticeable impact on choice of methods of analysing the land-use change for the Mvurwi Town case study. The most obvious alteration that was seen in the neighbourhood was in the shape and functionality of pre-existing buildings when they were transitioned from one land-use category to another.

The sampling units used for a more thorough investigation of land-use change, including commercial areas, high density residential areas and central business district offices. Research assistants then conducted physical land-use surveys on the sampling units. In this instance, blocks of stands bounded by roads were the chosen units of analysis. The reclassified land-

use method was then used in plotting established land-uses on the map.

Table 5: *Case study land use change analysis* (Machakaire, 2023)

Activities	Inputs	Methods/Tools S	Outputs
Base Map production	Surveyor-General topographical maps, Zoning maps and satellite photographs	Mosaicking and spatial referencing	Land inspection map
Land-use Zones	Local plan map	Merging Local plan, vector data files and editing in QGIS	Combined land-use map
Preparation of separates vector files for sample areas various uses	Combined Land utilisation Map	combined utilisation map	Sample areas vector data for zoned uses
Current land-use classification	Land Utilisation survey findings	t excels r analyses	Current classification of property use for sample zones
Creating distinct vector files for sample areas current property uses	Sample areas vector files for prescribed uses and existing land-use classes for sample areas tables	Exporting data from sample areas vector files and export files in QGIS	Vector files for current property uses.

DEVELOPING AN E-DEVELOPMENT CONTROL MODEL
In developing an e-development control model, the study adopted the classical waterfall model which, according to Saeed *et al.* (2019), outlines life cycle into phrase which is ideal in the case study to be undertaken.

Finding out whether developing a product (e-development control model) would be technically and financially feasible was done as part feasibility study as outlined by Gao *et al.* (2021). Policy-makers and executive officers were met to have an in-depth understanding about the development control setbacks and look into potential solutions. The best development control method was then chosen and its technical and financial viability was assessed and noted that it was able to support the model.

The second stage of the process involves requirements analysis and specifications. The process of acquiring and assessing Town Council needs was known as requirements-gathering and analysis. The interviews and conversations, all pertinent information about the product (e-development control model) which would be built, was first gathered as part of the requirements analysis exercise. The study spoke with the Town Secretary, the Town Engineer and the Town Planner in the council to determine their needs in e-development control. Due to the company structure, not all officers were technical and this rendered the data gathered from this group of users typically contradictory and ambiguous. Therefore, contradictions and ambiguities in the requirements and work was eradicated through additional conversations with the executive officers.

The aim of the design phase was implored to convert the SRS document's requirements into a structure which can be implemented in a programming language. At this stage, the software architecture was developed from the SRS document during the design process. The traditional design technique was used since every stage in the process that is typically serial or sequential, was completed all at once or according to a specific arrangement only after prior phases had been completed.

ELEMENTS OF THE SYSTEM

Architecture, that is, the conceptual model that defines the e-development control model, is made up of the following:
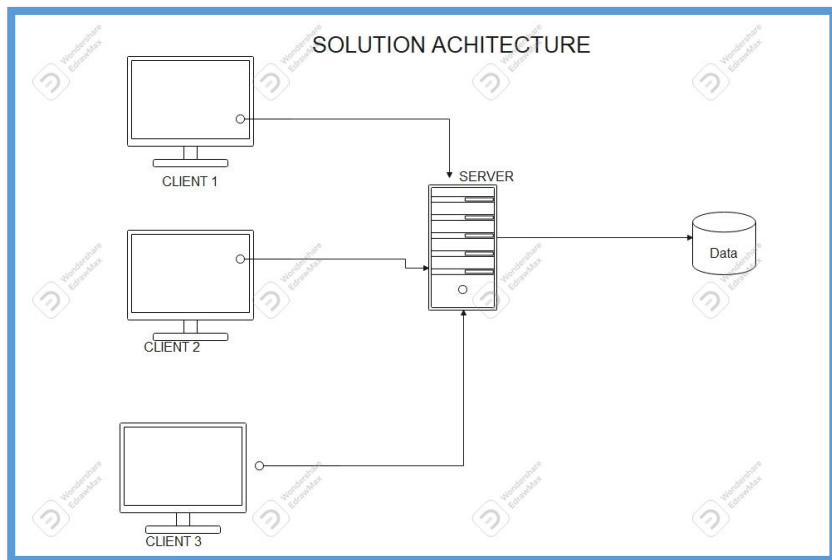
Figure 4: *Conceptual model for the e-development control model* (Authors, 2023)

Module in this case refers to building inspection, plan approval, development spatial plans and change of use and special consent. The goal of the coding phase of the software development process, often referred to as the implementation step, is to convert the programme design into source code. A programme module is used to implement each element of the design. A collection of individually tested programme modules is the result of this step. Each module was unit tested at this step to ensure that each one is operating correctly. It entailed testing each module separately because this is the most effective way to troubleshoot the faults found at this point. The current components were connected using PHP script programming language. However, for it to be successful, the abstract design plans had to be "translated" into a realised system. As a result, it uses design phase inputs.

Once coding had been done and units were tested, various components were integrated. The modules were carefully integrated during the system testing and integration phase. A

software product's various modules are usually never all integrated at once. Integration is often accomplished in a series of small steps. In this case, each integration step involved testing the partially integrated system and adding several previously scheduled modules to it. System testing was done at the end, once all the modules had been successfully integrated and tested. System testing's objective is to confirm that the created system complies with the specifications provided in the SRS document. Figure 5 illustrates the process followed in developing the model.
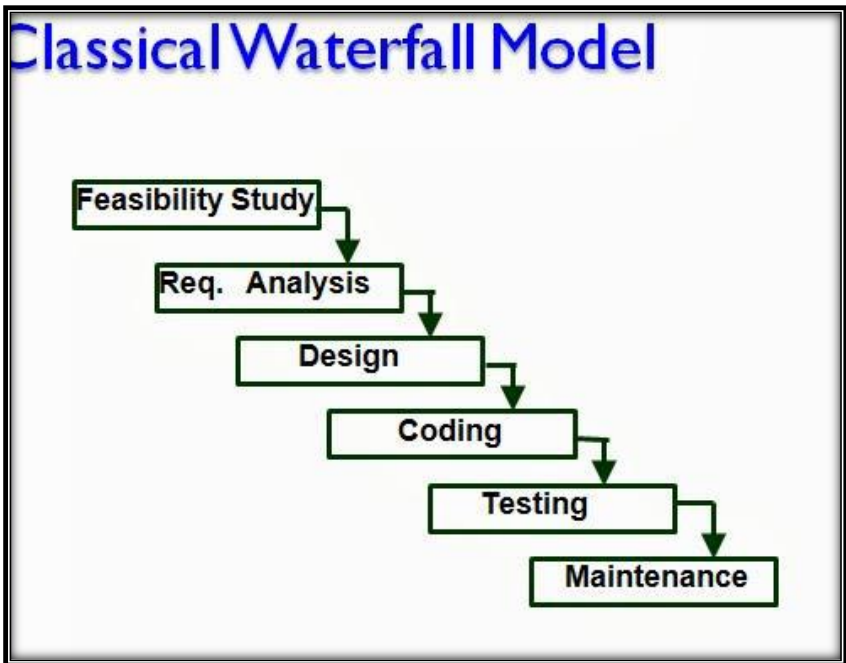
Figure 5: *The waterfall mode* (lBudgen, 2003)

The research's use of geospatial technology was severely constrained by the lack of a geo-data base for Mvurwi Town. Therefore, a new database was developed using zoning maps, Google Earth photos and Surveyor-General's 1:5000 map series. The process took time and the accuracy in geo-referencing exercises determined how accurate the mapping would be.

When compared to the high-resolution geo-eye often employed for image analysis, Google Earth Pro's spatial resolution is quite low. The research ultimately had to use mosaicked photos from smaller areas of the study that had to be geo-referenced. That process not only took times, but it also reduced the precision. In addition to the tendency for people to defend normative behaviours and thus resisting potential change out of concern which it might be interpreted as incompetence on their part, their reliance on key stakeholder data practising planning in MTC was a source of interviewee biases. However, because open-ended questions constituted most of the study design tools for interviews, this bias was minimised. Some property managers were reluctant and, in some instances, refused, to take part because they believed the whole process was a waste of their precious time which they could have used more effectively.

FINDINGS
This section presents data and analytical findings of the research. This section is meant to organise the study results by presenting, analysing and interpreting the meaning with regard to e-planning through geoinformatics in the development of a development control model. This is done under several sections covering the research objectives. For purposes of gathering data, the study administered a structured questionnaire. It was distributed to residents of MTC area of jurisdiction who are the property owners or holders as depicted below.

Table 6: *Questionnaires distributed to residents of Mvurwi Town* (Survey, 2023)

Class	Frequency	Percent	Valid percent	Cumulative percent
Non-returns	107	31.4	31.4	31.4
Missing values	47	13.8	13.8	45.2
Returns	187	54.8	54.8	100.0
Distributed	341	100.0	100.0	

As shown in the Table 7 above, 302 questionnaires were distributed to respondents, the residents of MTC area of jurisdiction. A total of 187 were deemed usable resulting in a

36

response rate of 54.8%. Based on these results, the questionnaire was deemed reliable to produce results that are generalisable to the population.

The section deals with demographic characteristics of sampled units where they help in identifying the study subgroups in this characterising.

Results in Figure 1 reveal 73.26% of the respondents were males and the remaining 26.74% were females. This shows that there is more male property owners in Mvurwi than females.

Table 7: *Age of Respondents* (Survey, 2023)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20 years	19	10.2	10.2	10.2
	20-30 years	102	54.5	54.5	64.7
	31-40 years	33	17.6	17.6	82.4
	41-50 years	18	9.6	9.6	92.0
	More than 50 years	15	8.0	8.0	100.0
	Total	**187**	**100.0**	**100.0**	

The age distribution shown in Table2 above reveal that 10.2% were below 20 years of age, majority of participants (54.5%) were between 20 to 30 years, 17.6% were between 31 and 40 years and 9.6% were between 41 and 50 years and 8.0% were above 50 years of age.

Figure 2 shows that 10.16% had been staying in Mvurwi for less than five years, while the majority (54.55%) represents those who had stayed between six to 10 years. Those who had stayed between 10 and 15 years and between 16-20 years accounted for 17.65% and 9.63%, respectively, while the remaining 8.02% had stayed in Mvurwi for more than 20 years.

The level of accuracy of the questionnaire was measured through reliability assessments. Reliability measures the degree of questionnaire being free of random errors. The Cronbach alpha was used in determining whether the questionnaire based on multiple Likert scale questions is reliable and a score of more than 0.7 is considered acceptable.

Table 8: *Reliability and Validity Statistics* (Survey, 2023)

Construct	No. of Items	Cronbach's Alpha
Development control methodologies frameworks	10	.921
Current development control frameworks	15	.973
Planning service delivery	6	.938

As illustrated in the table, the Cronbach alpha coefficients were very good and excellent, ranging from 0.921 to 0.973 for all the constructs. The Cronbach alpha coefficients surpassed the minimum threshold of 0.6 as recommended.

IDENTIFICATION OF THE UNDERLYING FRAMEWORKS FOR DEVELOPMENT PLANS IN MVURWI.

The first research objective focused on identification of the underlying frameworks for development plans in Mvurwi. The study undertook a documentary review of the underlying development frameworks for Mvurwi. The study noted that MTC has various legal frameworks that guide developmental plans and these legal frameworks are in two categories, the generic legal frames and ones that are specific for MTC to guide, shape, spearhead and control development within its jurisdiction.

Mvurwi Legal Development Control Frameworks are the laws, rules and guidelines that manage how town council land is used and developed within its jurisdiction. These frameworks are frequently employed to help council and executive officers in land use planning and development make sustainable and equitable decisions.

THE MVURWI LEGAL FRAMEWORKS EXIST FOR CONTROLLING SPATIAL GROWTH ARE

Zoning laws: The research reviewed that MTC has a 1992 Local Plan that had zone parts of Mvurwi Town in different zone, such as residential, commercial and residential and institutional, recreational, industrial and open space.

Environmental laws and rules were also examined and it was part of the legal frameworks which the council has in place and stipulates that development should commence without an environmental issue, with the intention to safeguard ecosystems and natural resources and to make sure that

development does not have a negative influence on the environment. Environmental rules may address matters like waste management, biodiversity preservation, water quality and air quality. The study also noted that there was the Constitution of Zimbabwe 2013 Amendment (No 20) which recognises devolution and decentralisation of state power and provides MTC constitutional protection. Section 3:2(i) thereof acknowledges devolution and decentralisation, and in terms of Section 5(c), MTC represents and oversees the affairs of the people in its jurisdiction. Sections 274:1 and 275:1 give council the authority to have own initiative and property rights exercised.

The study observed that Mvurwi Town is also regulated by the Urban Councils Act, which governs urban settlements and respective councils, covering housing construction and provision and estate development that are closely tied to ministry functions. It stipulates how Mvurwi Council can get financing, put it to use for urban development and communicate with the minister. The framework that councils provide health, education, sanitation, street lighting, housing and anchors on the generation and application of financial resources in accordance with the council's plans and budgets, as provided for by the Act.

It was noted that council has the Housing Standards and Control Act as a mechanism which directs the construction of superstructures (housing units). Some of the initial rules that were widely seen as excessive, were amended by Circular No. 70 of 2004. Together, these changes enabled the government to address concerns about substandard constructions, overpopulation and the regulation of damaging property usage, including the protection of neighbouring property rights. Buildings that are subpar can be demolished. It stipulates the room size and the council's authority to regulate development and, in exceptional cases, when ordering demolition. These together with the RTCP Act, provide a basis for the establishment of council bylaws (Mafico 1989),

The Town and Regional and Country Planning Act (1976) is one of the principal Acts that was being used by MTC to govern the spatial planning of regions, districts and localities, focusing on the preservation and enhancement of the natural environment, the promotion of health, safety, convenience and general

welfare, and the efficiency and economy of the development process. The Act was utilised together with its subsidiary legislation, the Statutory Instrument 216 of 1994, which resulted in authorising non-residential activities in residential areas (change in use regulations), but the main legislation is still heavily influenced by colonial land-use planning and control norms.

DESCRIPTIVE STATISTICS FOR DEVELOPMENT CONTROL METHODOLOGIES FRAMEWORKS

Descriptive statistics for the development control methodologies frameworks in MTC area of jurisdiction are analysed in Table.

Table 9*: Standard deviation, mean range, minimum, maximum and kurtosis development control methodologies frameworks* (Survey, 2023)

Observed variables	N	Range	Minimum	Maximum	Mean	Std. Deviation
Illegal developments	1874	1	5		2.87	1.195
Plan approval process	1874	1	5		2.87	1.195
Development regulations	1874	1	5		2.79	1.442
Property owners and approved plans	1874	1	5		2.79	1.442
Service delivery in planning	1874	1	5		2.71	1.438
Construction on planned areas	1874	1	5		2.71	1.438
Modern technology in planning	1874	1	5		2.22	1.299
Inspection bookings	1874	1	5		2.22	1.299
Building inspection	1874	1	5		2.11	1.116
Approved building plans	1874	1	5		2.11	1.116
Valid N (listwise)	187					

According to development control methodologies frameworks in the above table, most participants rated illegal developments and plan approval process as the items with the most pronounced role, measuring development control methodologies frameworks in MTC. In terms of the mean ratings, the highest was 2.87 and this matched the illegal developments and plan approval process, followed by development regulations and property owners and approved plans with 2.79. Service delivery in planning and construction on planned areas had a mean value of 2.7, 1followed by modern technology in planning and inspection bookings with a mean of 2.22. The bottom two were building inspection and approved building plan which had mean values of 2.11. These results indicate that respondents felt that MTC had challenges in illegal developments plan

approval process, development regulations, property owners and approved plans, service delivery in planning, construction on planned areas and modern technology in planning, inspection bookings, building inspection and approved building plan. This is so, given that their mean values were within the agreement side.

Documentary evidence was essential in data presentation, particularly in this research where data needs was verified to identify the Mvurwi underlying development frameworks and evaluating their effectiveness. It also included citations to relevant sources such as the Local Plan, detailed descriptions of research methodologies and change of use information that supports the accuracy and validity of collected data as the study helps building trust in the findings and ensured that this it is credible and reproducible.

CHANGE OF USE AND SPECIAL CONSENT APPLICATIONS REGISTER
The study undertook a review of change of use (COU) register in Mvurwi covering the period from 2010 to 2022 and served as the beginning of the consultative portion of the research. The aim of the exercise was to evaluate categories, scope and volume in terms of applications sent to the MTC. To assess how well development control frameworks were responding to shifting urbanisation trends, the exercise's second goal was to ascertain how carefully such applications were being handled. Dealing with a handwritten tabular sheet that appeared incomplete, presented the biggest challenge in analysing the MTC record. The register was divided into columns containing data on the application number, applicant's name, stand number or property address, the present land-use zoning, the land-use requested and the status of application. The decisions made about the applications featured almost no information which was the register's most alarming feature.

When questioned regarding blank columns, the concerned officers justified it as some omission or that application was being processed. The study was concerned by the ramifications of that ambiguous remark. The handwritten registration system is too outdated, resulting in inefficiency in record-keeping of applications. The registers were established in 2022. Previously, the process had not been completed and there was no register for applicants in place.

The MTC it is taking too long to process applications since no one is bothered to record them in the register. The second supposition regarded the manual registration process as being limited. Only the concerned officers had access to that document, making it impossible for system managers or supervisors to conduct any effective monitoring. Therefore, the research went on to enter all the records on Microsoft Excel spread sheet to make it easier to analyse the data in the register. In the next section, the focus is on evaluating the current development control practices in Mvurwi Town.

The first research objective focused on evaluating the current development control practices in Mvurwi Town. The 5-point Likert Scale was employed with a maximum rating of 5 and a minimum of 1 and the median being 3.00. Descriptive statistics for the current development control frameworks in MTC area of jurisdiction are analysed in Table 10.

Table 10: *Standard deviation, mean range, minimum, maximum and kurtosis - Current development control frameworks* (Survey, 2023)

Observed Variables	N	Range	Mini-mum	Maxi-mum	Mean	Std. Deviation
Technology in plans approval	187	4	1	5	2.70	1.596
Laws in construction projects	187	4	1	5	2.70	1.596
Local plan	187	4	1	5	2.70	1.596
Monitoring developments	187	4	1	5	2.39	1.161
Plans approval checklist	187	4	1	5	2.39	1.161
Industrial plans	187	4	1	5	2.39	1.161
Planning requests	187	4	1	5	2.12	1.332
Construction guidelines and developers	187	4	1	5	2.12	1.332
Commercial plans	187	4	1	5	2.12	1.332
Planning services	187	4	1	5	2.07	1.328
Plans approval by professionals	187	4	1	5	2.07	1.328
Residential plans	187	4	1	5	2.07	1.328
Technology in building inspection.	187	4	1	5	1.97	1.370
Construction guidelines and contractors	187	4	1	5	1.97	1.370
Local plan's land-use classes	187	4	1	5	1.97	1.370
Valid N (listwise)	187					

As shown by the results tabled above, most participants rated technology in plans approval, laws in construction projects and local plan as the items with the most pronounced role

measuring current development control frameworks in Mvurwi Town. In terms of the mean ratings, the highest was 2.70 and this matched the rated technology in plans approval, laws in construction projects and local plan, followed by monitoring developments, plans approval checklist and industrial plans with 2.39. Planning requests, construction guidelines and developers and commercial plans had a mean value of 2.12, followed by planning services, plans approval by professionals and residential plans with a mean of 2.07. The bottom three were technology in building inspection, construction guidelines and contractors and local plan's land-use classes and had mean values of 1.97. These results indicate that respondents felt that the MTC had challenges in illegal developments plan approval process, development regulations, property owners and approved plans, service delivery in planning, construction on planned areas and modern technology in planning, inspection bookings, building inspection and approved building plan. This is so, given that their mean values were within the agreement side.

CORRELATIONS STATISTICS - CURRENT DEVELOPMENT CONTROL FRAMEWORKS

The study first used correlations statistics in establishing the level of association of current development control frameworks and planning services delivery. Results are tabled below.

Table 11: *Pearson's Correlations: Current development control frameworks and planning services delivery performance* (Survey, 2023)

		CDC	DET
	Pearson Correlation	1	
CDC	Sig. (2-tailed)		
	N	187	
	Pearson Correlation	.541**	1
DET	Sig. (2-tailed)	.000	
	N	187	187

**. Correlation is significant at the 0.01 level (2-tailed); CDC – current development control frameworks; DET – planning services delivery

The correlation results for current development control frameworks and planning services delivery are illustrated in the table above. The results show that current development control

frameworks and planning services delivery positively correlate with each other (r =0.541, p of 0.000 significant at the 0.05 level). This shows that improved use of current development control frameworks is a great way to ensure improved planning services delivery by MTC.

REGRESSION ANALYSIS - CURRENT DEVELOPMENT CONTROL FRAMEWORKS AND PLANNING SERVICES DELIVERY

For purposed of first research objective, the ensuing proposed hypotheses was tested:

- H_0: Planning services delivery is independent of Current development control frameworks.
- H_1: Planning services delivery is dependent of Current development control frameworks.
- Statistical Test: Linear regression analysis
- Parameters: 95%, 2 tailed
- Rejection Criteria: Reject H_0 if $p < 0.01$.

Linear regression established the relationship between current development control frameworks and planning services delivery as guided by the research objectives and hypotheses as shown below.

Table 12: *Regression Model - current development control frameworks and planning services delivery* (Survey, 2023)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.541a	.293	.289	.9088030

a. Predictors: (Constant), current development control frameworks

Results from the analysis above, the r^2 value of 0.293 suggests a 29.3% direct effect of planning services delivery from development control methodologies frameworks. This means that the remaining 70.7% were explained by other variables, other than current development control frameworks.   To evaluate the above regression model validity, the ANOVA model fit test was performed as shown in Table 13.

Table 13: *Model Fit: Regression Analysis - current development control frameworks and planning services delivery* (Survey, 2023)

ANOVA[a]						
Model		**Sum Squares**	**ofdf**	**Mean Square**	**F**	**Sig.**
	Regression	63.378	1	63.378	76.736	.000[b]
1	Residual	152.796	185	.826		
	Total	**216.174**	**186**			

a. Dependent Variable: planning services delivery
b. Predictors: (Constant), current development control frameworks

Regarding the results above, $F(1; 185) = 76.736$ and the p-value for the model fit was 0.00 and is less than 0.05, therefore significant. Therefore, in terms of the proposed hypothesis, the decision was to reject the null hypothesis and it was concluded that planning services delivery is dependent on current development control frameworks. In this vein the resultant regression coefficients are shown in Table 14.

Table 14: *Regression Coefficients - current development control frameworks and planning services delivery* (Survey, 2023)

Coefficients						
Model		Unstandardised Coefficients		Standardised Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.386	.145		9.556	.000
1	Current development control frameworks	.502	.057	.541	8.760	.000

a. Dependent Variable planning services delivery

The results above show that the regression coefficients were all significant $p<0.05$. Therefore, the relationship can be modelled as follows:
Planning services delivery = 0.1.386 + 0.502 * (current development control frameworks)
In terms the stated first hypothesis:
▪ H_0: Current development control frameworks is independent of planning services delivery (reject)
▪ H_1: Current development control frameworks is dependent on planning services delivery

In the next section, the focus is on assessing the current methodologies used for development control process in Mvurwi.

ASSESSING THE CURRENT METHODOLOGIES USED FOR DEVELOPMENT CONTROL PROCESS IN MVURWI

INTERVIEW FINDINGS

As a triangulation tool, interviews were done with six key informant who are planners and the results are analysed, presented and interpreted in the following sections.

POLICY AND TREND ANALYSIS

Six professional officials were interviewed by the study, including those from government (one Provincial Planning Officer and two Principal Planning Officer from Physical Planning Department), a planner, a town engineer in charge of projects in Mvurwi Town and two planning consultants from the private sector. Key informant interviews were meant for critical evaluation of procedures, information and effectiveness in planning activities by Mvurwi. The respondents were grilled by structured questions on topics related to the development control frameworks brought on by such processes. The following subheadings were used in the question format to explicitly elicit responses and discussion in the interview guide.

1. Does council have any developmental frameworks like Master, Local or Layout plans?
2. Explain the developmental framework in terms of it being valid?
3. Do you feel like commenting on master and local plans in use in terms of
   a) Exhaustiveness, contents and accuracy?
   c) Period covered by the plans?
   d) Effectiveness?
4. Are there any limitations in Local Plans being used in urban development management?
5. Are the Local Plans well provisioned in dealing with planning with regard to:
   a) Informal process?
   b) Inclusive process?
   c) Equality?

d) Sustainable development?
6. Can you rate the participatory tendencies in the planning process regarding:
   a) Consultative
   b) Informative
   c) Formulative
7. In terms of use of geoinformatics, is it going to improve planning service delivery?

MVURWI LOCAL PLAN

Different responses were furnished by the active planners to the topic on the details and content included in local plans. Some officers argued that there was nothing wrong regarding contents in the plans if they are developed in line with the RTCP Act and was mostly represented by planners with more expertise in the production and administration of the LP. They claimed that because they covered every facet of urban life, therefore there was need to be exceptionally thorough and holistic. Even more, they said that rigidity was not a result of exhaustiveness as it was prescribed by law that planners needed sufficient undefined latitude in handling change. However, they acknowledged the LP as being routinely evaluated as required by the RTCP Act and they attributed this to a lack of enough funding.

Other planners believed in plans are unnecessarily uniform and overly generalised, making them unsuitable for many types of scenarios. They argued that too much time was spent on unimportant details and blamed the practice's shortcomings on some planners' lack of creativity. They generally agreed that planning should be done. The third group, composed primarily of young planners, believed that conventional planning frameworks are not flexible and immovable, thus could not meet the demands of contemporary society. Some members of this group proposed mixed use and periodic zoning, allowing guaranteed commerce even after working hours.

INFORMALITY, INCLUSIVITY, EQUITY, SUSTAINABLE AND DEVELOPMENT.

The six interviewed planners agreed that current the local plan was intended exclusively for formal settings, thus there was absolutely no opportunity for informality in them. However, the majority expressed sympathy for and appreciation of the

informal sector economic role. They recommended that strategies and tactics be developed to accommodate it. The planners were so intrigued by the issue of informality that some of them eventually proposed that the phrase "not permitted" be completely eliminated from LPs and other government officials.

There was also broad agreement that Zimbabwe's current planning frameworks typically avoid addressing fashionable planning ideas of inclusion, equity and sustainable development. Even further, one planner asserted that the LP remained heavily adherent to colonial principles and that they served to advance NIMBYism. Even after the mentioning of how EMA override planning decisions, the interviewee explains how planning system was ineffective and reactive. According to him, the planners are too quiet and do not stand up for their own professional interests (Makaza, 2023).

PUBLIC INVOLVEMENT IN PLANNING

The purpose of the participation conversations was to learn how practising planners assessed the importance and scope of public involvement through information and consultations. Further discussions focused on public involvement plans development throughout the interviews with respondents.

The majority of planners rated public consultations when planning and noted them to be insufficient, given its focus on "key stakeholders", while excluding the broader public. Some of the interviewees went so far as to call the entire procedure elitist because a selected few had the capacity of accessing the offices where LPs are displayed for public discussion. There have been recommendations that the planning process be made more collaborative by holding public meetings. There was criticism of polling the public using a questionnaire as it led public participation to ideas which had previously been planned by experts (Chinamira, 2023). Public involvement in designing and formulating of programmes elicited a range of responses. The more conservative planners expressly said that only trained professionals with specialised knowledge could create plans. They also argued that there was no purpose in including regular people because the procedure was too complex for them to

understand. The surveys conducted during the early stages of plan-creation, according to one planner who appeared to follow the "Geddesian" approach, were more than sufficient.

THE USE OF TECHNOLOGY PLANNING

All planners concurred that Mvurwi Town either used very little or no technology in the creation of the LP and planning process. Given that the decision-makers completely misunderstood how beneficial computerised planning systems are, some people complained of not having access to computers in their individual organisations or some had computers but were not connected to the internet. All the interviewees believed that using GIS and computer-aided planning systems was a good idea. Again, there was broad consensus regarding the necessity of introducing computer-based technology as a tool to help with planning. The table 15 lists some of the main arguments in favour of the usage of technology in planning.

Table 15: *Planning Technology* (Survey, 2023)

Aspect of technology usage	Sample	Agreed	Non-committal
Systems make it easy to update plans and spatial data.	6	4	2
The introduction of clearer visualisation tools and satellite imagery would pique the interest of non-technical stakeholders in planning processes.	6	5	1
Making use of data manipulation and improved spatial analysis and tools provided by GIS and other IT systems.	6	6	0
Technology will strengthen local planners' connections to other experts, both locally and globally.	6	4	2
Data collecting is made simpler by information technology that also typically has more storage space.	6	5	1
Planning process is made faster and easier	6	4	2
Development control is made easy, effective and efficient.	6	6	0
Technology will provide a link with other supporting departments such as Finance and Housing and Social Services	6	5	1
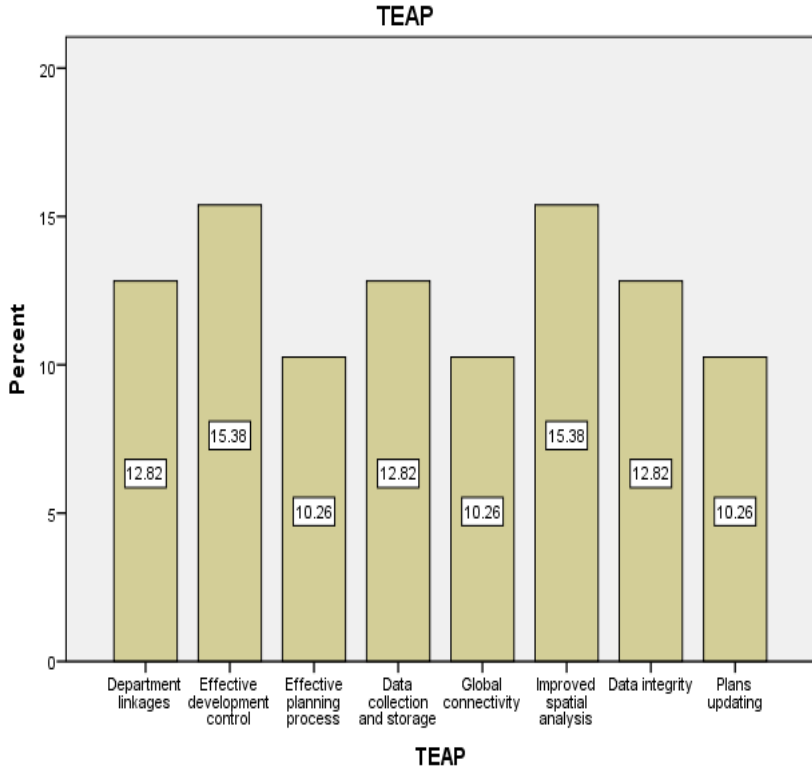
Figure 6: *Reason for Use of Technological Application* (Survey, 2023)

Despite the use of interviews as a qualitative approach, the study analysed responses statistically as illustrated in the figure above due to their comparative nature to the necessity of employing planning technology. The ease of updating plans was the most frequently given justification for wishing to employ technology in planning, confirming the popularity of the idea that highlighted a need for more frequent plan reviews as articulated earlier. The use of the extraordinary data processing and geographical analysis linked to GIS was the second most common justification. The GST's ability to be visualised, to save

time and to encourage participation, were other often cited reasons.

TRIANGULATION OF RESULTS
The utilisation of qualitative, quantitative and documentary data sources, such as time, place and property owner, can be inferred as data triangulation in this research. Findings from the research is confirmed and any data inadequacies was made up for by the strengths of additional data, improving the results' validity and dependability. The method has been applied in the research to reinforce findings' conclusions and lower the possibility of erroneous interpretations. Based on the information obtained from qualitative, quantitative and documentary data, the study observed that there is need to have a development control model for effective development control. The next topic is the development of the e-development control model.

DEVELOPING AN E-DEVELOPMENT CONTROL MODEL FOR MVURWI *E-DEVELOPMENT MODEL*
 The study utilised the triangulation method grounded in qualitative and quantitative techniques. The study points out the need to establish an e-development control tracking model. The study developed an e-development model comprising five modules, namely Property Database, GIS, Artisan, Building Inspections and Plan Approvals. These modules allow both local authority control, spearhead and guide development taking place in their jurisdiction. The e-development control model has two interfaces. The first is the super user where all the property data are captured and the assignment of the required personnel and the second face where all the modules appear. This is a super user interface (Figure 7),
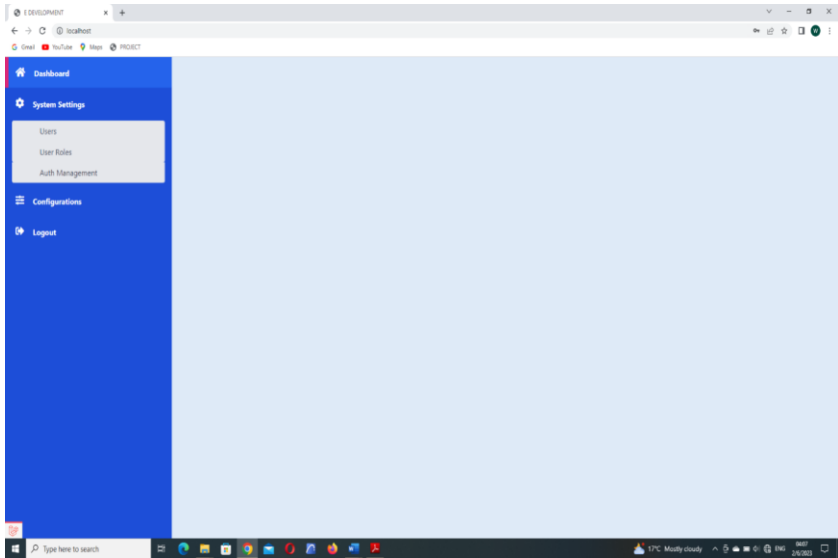
Figure7

In this interface, assignment of users, roles of each personnel in the development control and the management of the system at large, is done.

STEPS IN THE SUPER USER

Uploading of company details (Figure 8)
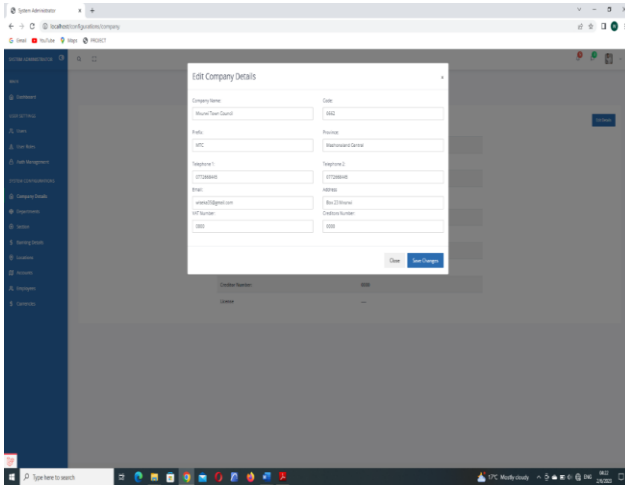
Figure 8

Selection of departments (Figure 9)
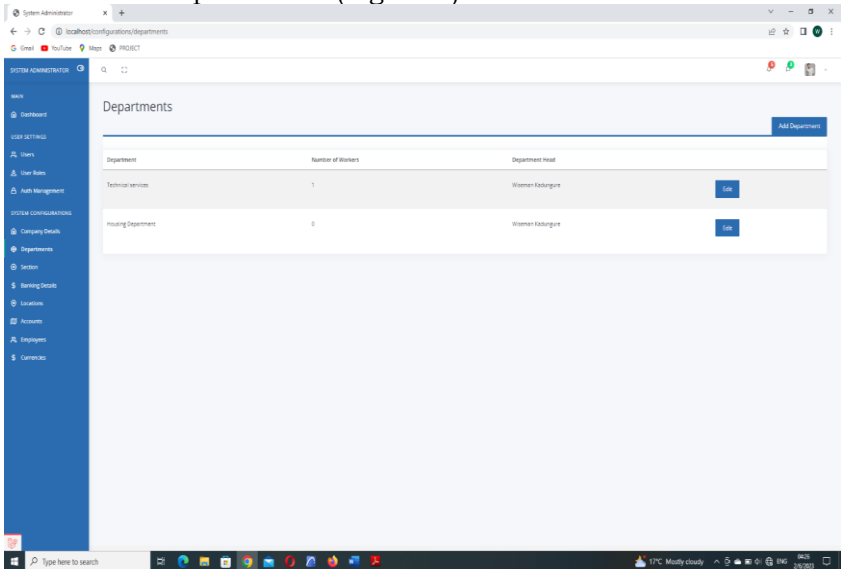
Figure 8

Assignment of the departments involved in the development control.

Selection of development control personnel (Figure 10)
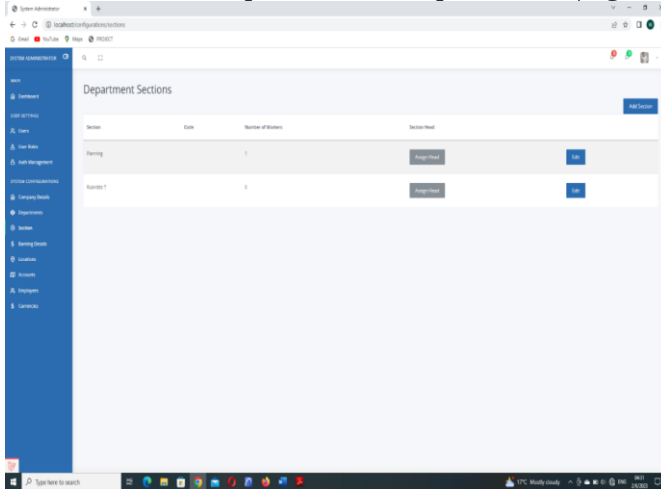
Figure 9

Assignment of personnel involved in the development control was done.

Uploading of property data (Figure 10)
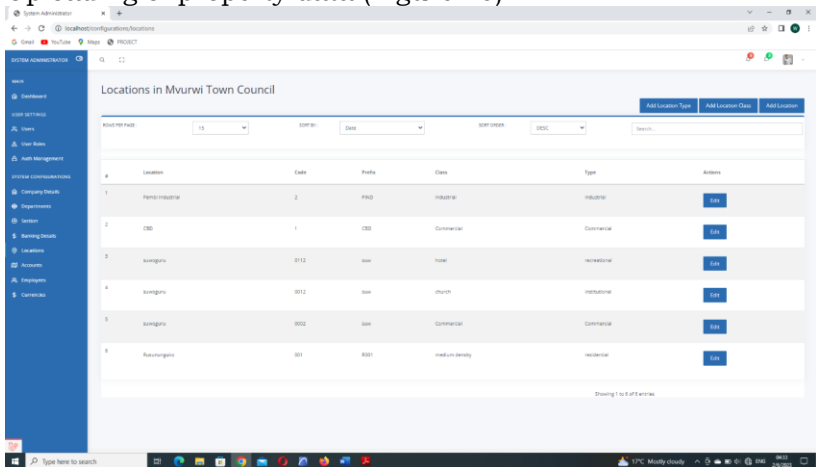
Figure 10

Uploading of property data is done and it includes the location of the property category of the property and the class of the property.

After setting the super user interface, the second interface follows (Figure 11)
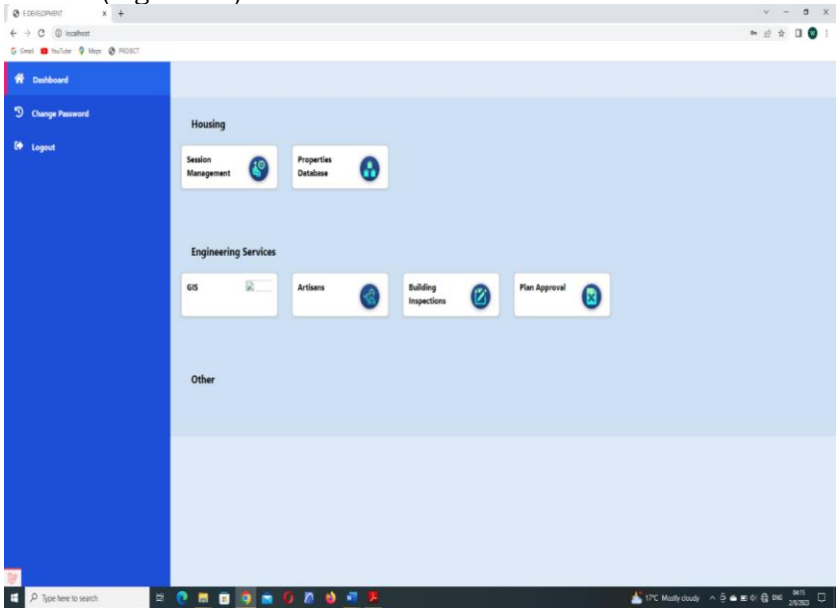
Figure 11.

This is the second interface mainly for development control which comprises property database, GIS, Artisan, Building Inspection and Plan Approval Module (Figure 12).

PROPERTY DATABASE MODULE
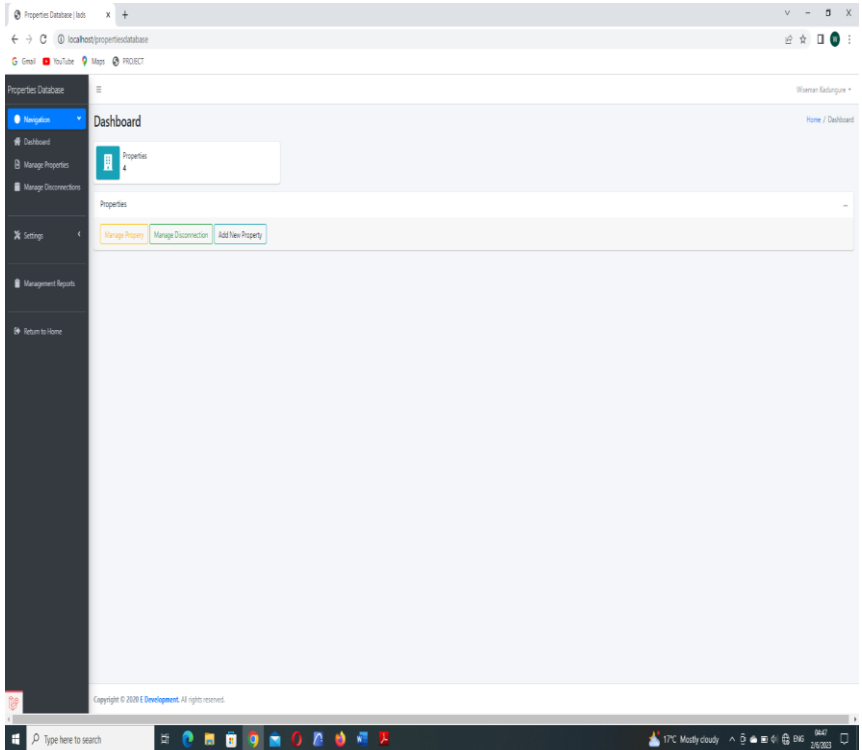
Figure 12

The adding of new property data, management of the existing data and the disconnection of property (Figure 13)

ADDING OF NEW PROPERTY.

Figure 13.

This is where property data is uploaded, the information that is uploaded is as follows: stand number, stand size, property name, account number, property category class and location, address of the property owner and contact details and property coordinates (Figure 14).

PROPERTY MANAGEMENT
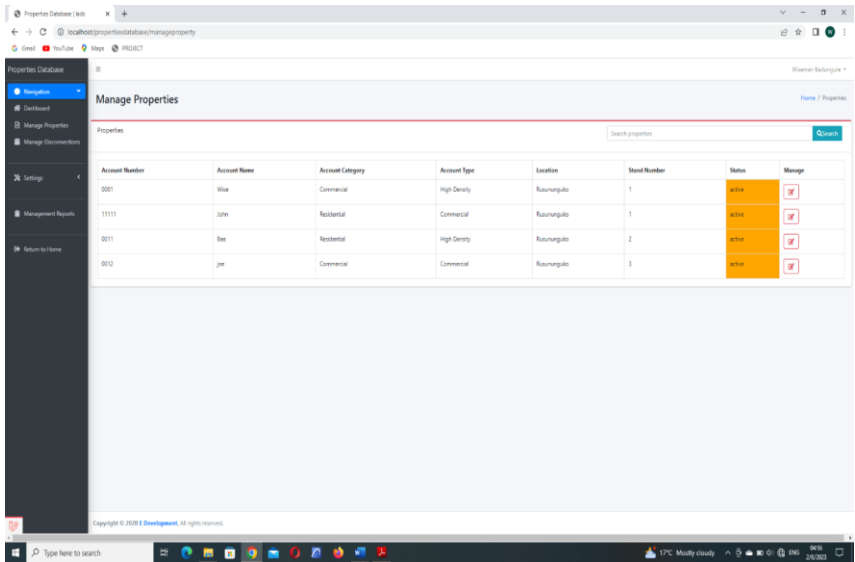
Figure 14

At this stage, property details will appear and show the status of the property (Figure 16).

ARTESIAN MODULE

Figure 16

In this module, you upload the new artesian which are in the development team such as builders, carpenters, plumbers, architects, planners et cetera.

Submit the application and upload all their personal and professional details and categories according to their fields of trade and approved or disapproved by the way a permit issued to practice in Mvurwi Town.

The local authority can make an assessment on the number of the registered artesian and check whether they are all active or not (Figure 17)

PLAN APPROVAL MODULE
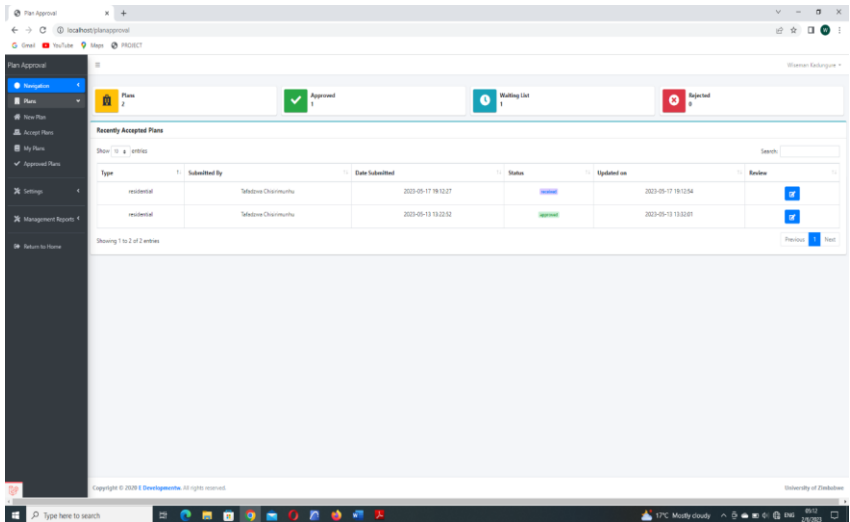
Figure 17

In plan approval module there are three process, submission of a new plan, accepted plans and approved plans (Figure 18).

NEW PLANS
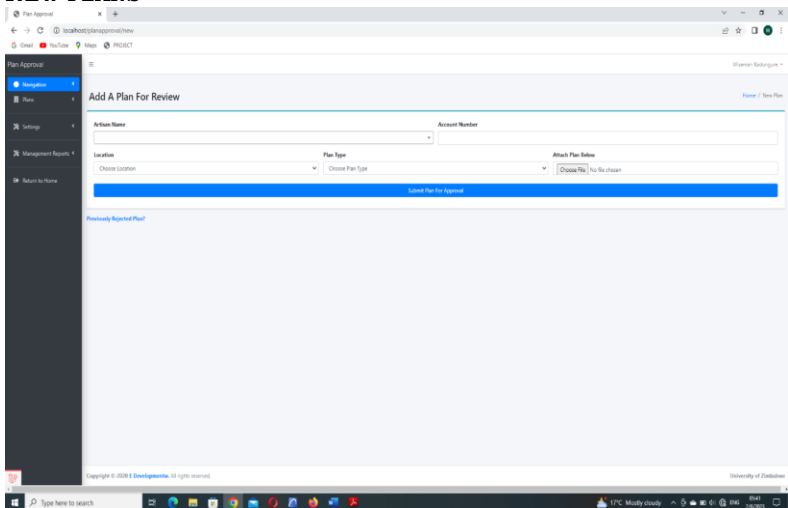
Figure 18

Under the new plan, you enter the name of the artesian and the system will search from the artesian database and upload/ You add the account number from the property database.

You choose the location of the property, the type of the property, then you upload your proposed plan. Then you click submit, the plan will be submitted (Figure 19).
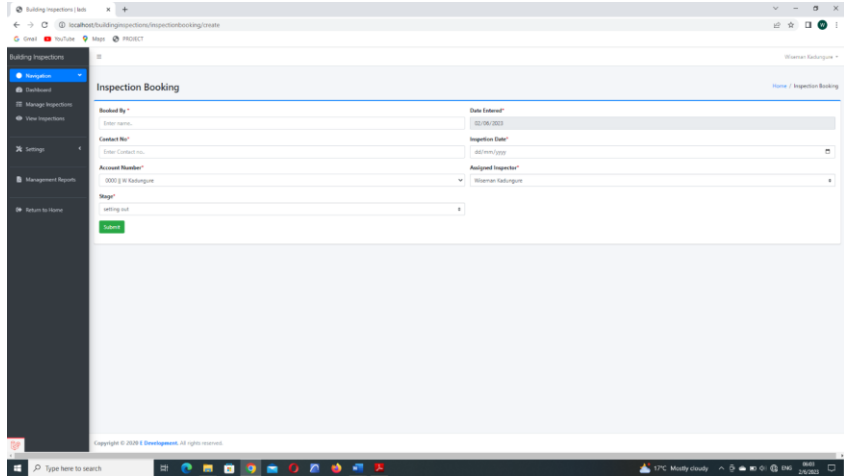
ACCEPTED PLANS
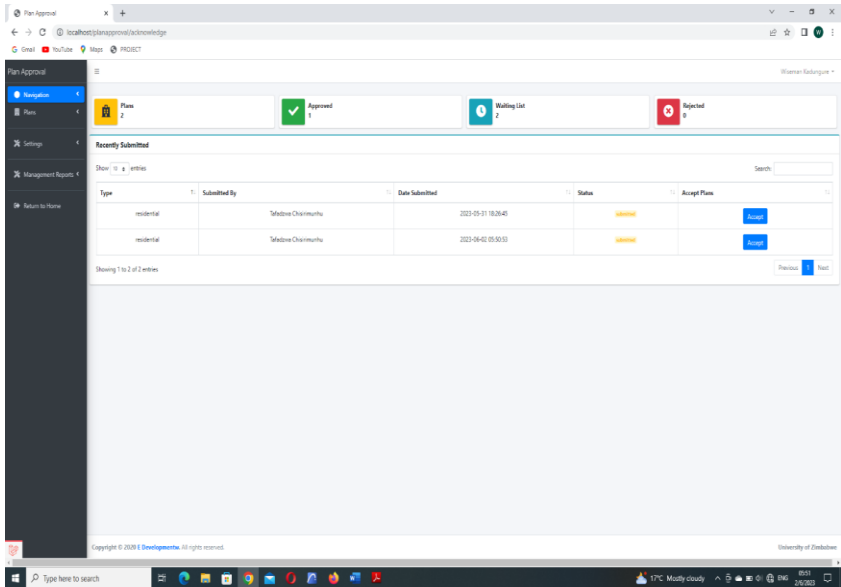
Figure 19.

When the plan has been submitted, you can click accept plans, then the name of the artesian and the name of the date it was submitted appear, then click accept and the plans will go in the system for approval. This will only appear to the assigned personnel to approve according to their roles. If one is done with Housing Department, it goes to the Health Department, if is satisfied, it goes to the Technical Services until the final approval is done. At every stage, the system will generate a short message service (SMS) to the property owner, notifying them of the completion of the process of the plan. The system

can also generate reports on the number of plans approved in different categories (Figure 20).

BUILDING INSPECTION MODULE

Figure 20

This is the interface where one can book for inspection for each stage that is taking place within Mvurwi Town. One must upload the name of the person that is doing the booking, date of booking the inspection, name of the property owner, account number linked to the property database, receipt for building inspection and phone number of the owner. When all the details have been entered, the message will be sent to the owner notifying that their booking has been done (Figure 21).
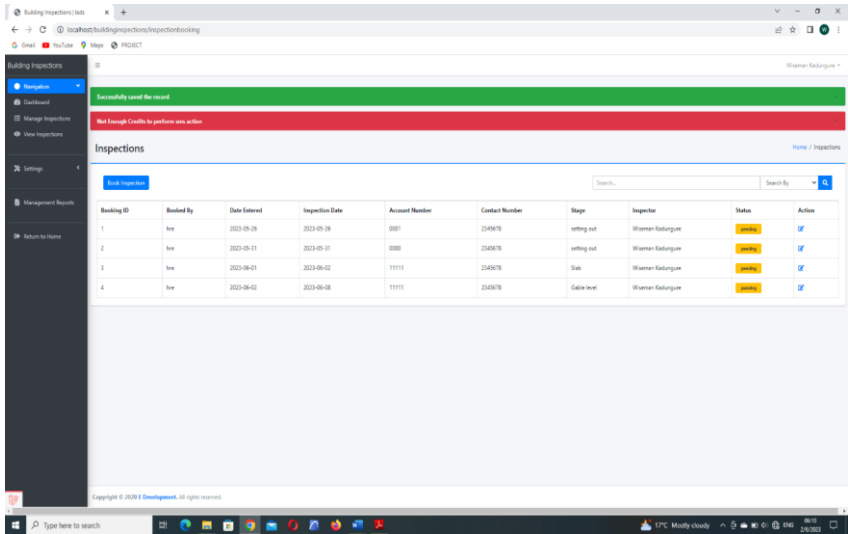
Figure 21

The message will pop up as soon the submission is done, then the inspector will now click on the action box to indicate whether the property has been inspected or not. If the property has passed the inspection, the inspector indicates a pass on the template and the inspector can also upload attachments like inspection form and the picture showing the level of development.

GIS MODULE
This module will show the position of the property on mapserver (Figure 22)

Figure 22

ONLINE DASHBOARD SYSTEM

The study developed a dashboard online system based on ArcGIS online, a cloud-based platform used to make and share apps or maps. One of the most powerful spatial data sharing and viewing platforms which can be designed on ArcGIS online is a dashboard.
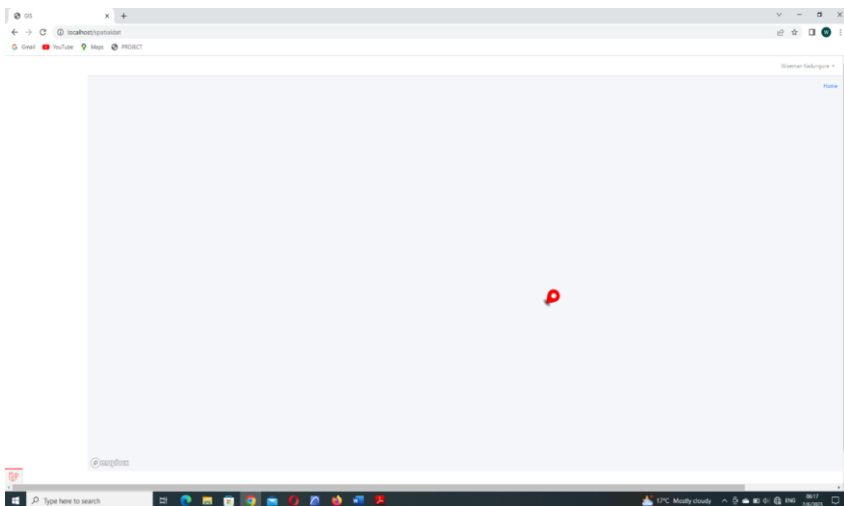
A dashboard is a view of geographic information and data which allows both the local authority and beneficiaries to monitor events, make decisions, inform others and see trends on any dataset. Spatial dashboards allow for the easy sharing, manipulation, analysis of both spatial and non-spatial data with any end-user from those who are well versed in GIS to non-versed personnel.

Steps in the design of the Mvurwi Pembi view Dashboard

SETTING UP OF DASHBOARD ENVIRONMENT

Before the design of any dashboards, a unique project file that will house all associated data and information of the project will need to be created (Figure 23).
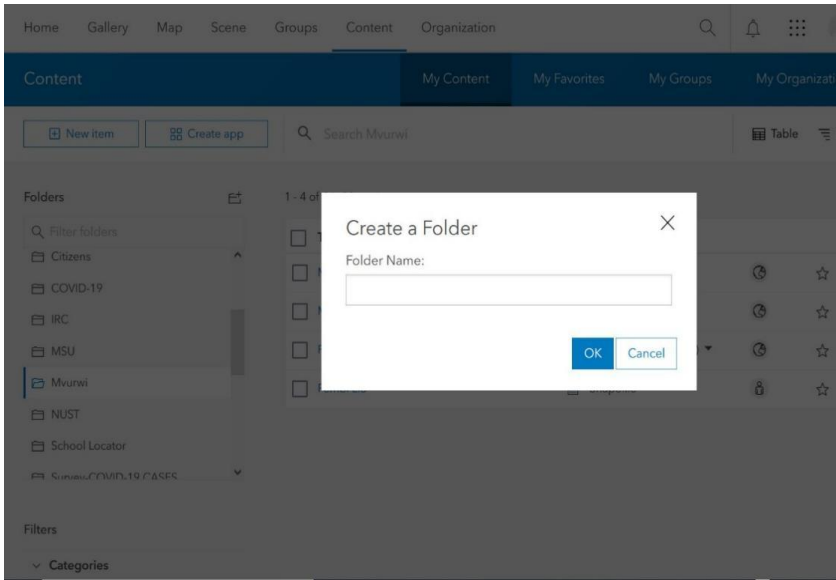
Figure 23

DATA UPLOADS

There are many ways to upload data on ArcGIS online, but the best practice used on the project was that of uploading all shapefiles as zipped files in one go. All the shapefiles to be uploaded and needed for displaying of information are uploaded into the ArcGIS online platform as shown in Figure 24
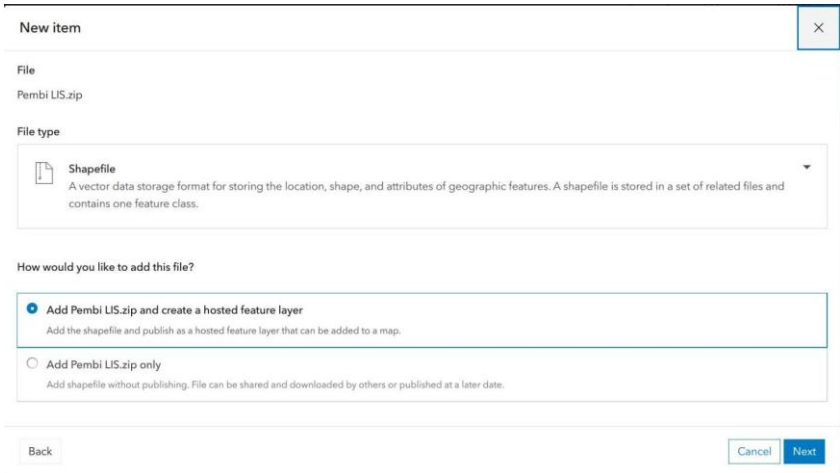
Figure 24

WEB MAPPING

Once all shapefiles are uploaded, a web map will be designed to house the interactive map whichwill be displayed on the final dashboard. All necessary cartography and symbolisation on the shapefiles are carried out on the map viewer page of ArcGIS online. The base map, where the vector layers will be sited, will also need to be defined on the map. All corresponding pop-ups for the vector layers on the map will also be defined (Figure 25.
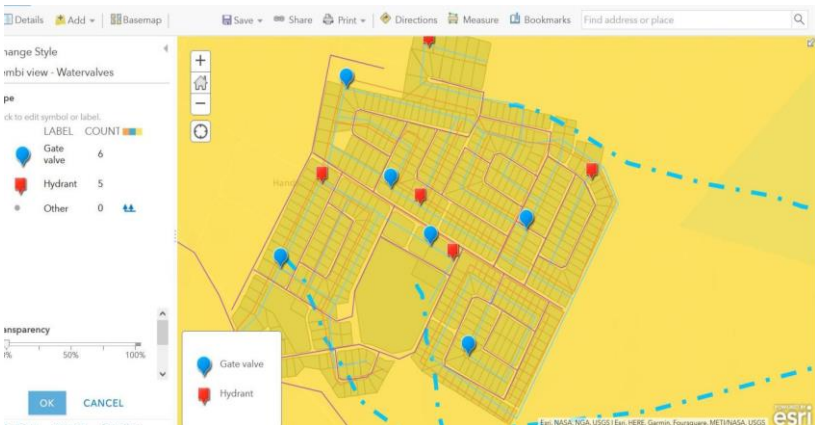
Figure 25

DASHBOARD DESIGN

To create a dashboard, you first need to specify the title of the dashboard and any other company icons like company logos. Once you set up the header, you upload the web map which you want to use for your dashboard and this will automatically sit on your body page of the dashboard (Figure 26).
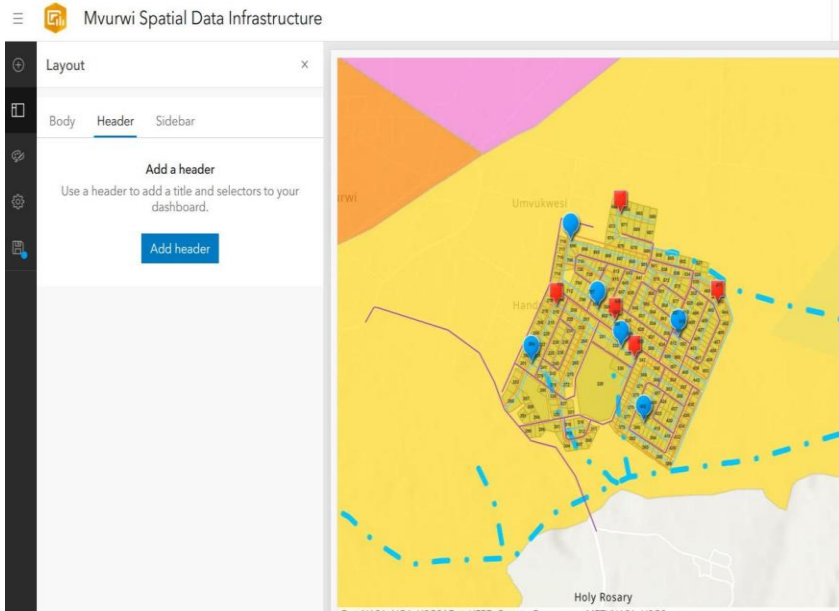
Figure 26

Elements such as graphs, tables and search bars, can then be added, depending on the nature of information that must be disseminated to the end users.

VALIDATION

The section focuses on validating two development control models developed by researcher on the topic of using e-development control methods to carry out urban development control. The models were validated by a series of tests and evaluations intended to gauge the models' effectiveness and ascertain whether they satisfied the criteria of the research topic. To verify the model applications, researchers defined the research issue and the models' goals, collected data typical of

the issue domain, divided it into testing and training sets, model development and model review. The research issue and the models' goals should be defined to make the validation process more streamlined. Cross-validation should be used to ensure the performance of the model is constant across various subsets of the data. Outcome's interpretation was used to interpret the model's performance outcomes and draw judgments regarding its efficacy.

Validating a development control model involves a series of tests and evaluations designed to assess the model's performance and ensure that it meets the requirements of the intended use. Common steps to validate a development control model include defining the model's purpose, collecting data, training the model, evaluating the model, performing sensitivity analysis, comparing results with baseline, interpreting results, iterating and improving the model, publishing the model in a peer-reviewed venue and monitoring performance over time.

The development control model was to enhance the local authority development control by reducing delays and improving efficiency. The model has improved efficiency and efficacy in the sense that at every stage, it provides notices to both the applicant and the service provider. It also provides information to the right personnel to do the development control, for the inspection model goes straight to the right department. The applicant does not need to visit council office often and this has fulfilled the National Development Strategy 1 (NDS1) digitalisation and devolution mantra.

The model simplified the data collection and data analysis has been made easy since one can input data at once and easily updated from time to time.

The first run of the model was done to check whether it is addressing the previous challenges within the local authority and whether it runs perfectly, except that the study could not have the "sms" credits so that the applicant could receive the message. If the credits where there, it was easy to get notices and track the progress made and the level of development.

The model was evaluated using the development control frameworks and procedures outlined in council regulations. The model development control method was enhanced since almost everything was being done online.

Issues to do with security were also incorporated in the model. Not every has access to edit the main database.

A comparison was made by the study between the previous development control practice and the model. The model has transformed the development control methods and improved the development control tools.

INTERPRETATION OF RESULTS WAS MADE EASY FROM THE MODEL AND IT COMPLIED

Some the methods were not explored due to time frames and room was left for other academics to improve the model and to do peer review of the model.

Validating an ArcGIS Online dashboard, a series of tests and evaluations to assess its performance were conducted to ensure they met the requirements of the intended use. Common steps include defining the purpose, testing data sources, evaluating the design, testing functionality, performing load testing, security testing, cross-browser and cross-device testing, interpreting results and monitoring its performance over time.

The purpose of the model is for interaction between the local authority and its property owners and was able to show spatial data and other information to do with the property.

The study made some test and verification of spatial data on the model and verification was done to see if the spatial data on the dashboard was corresponding with what was on the council database and the information was tallying.

The study observed that the dashboard does not have maximum security it deserves as it involves confidential information. Since it just for academic purposes, the study decides to leave it that way. The study statistically tested both

the e-development control model and the land information model used to determine how much of a research study's conclusions can be regarded as accurate and dependable. The study had enough from the questionnaires, interviews and documentary findings and to use the best statistical method for analysing that data to obtain the model's validity. The Anova Model was used in validating the regression model to confirm the significance of the model in confirming the need for the e-planning process.

Table 16: *Model Fit: Regression Analysis - Current development control frameworks and planning services delivery* (Survey, 2023)

ANOVAᵃ

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	63.378	1	63.378	76.736	.000ᵇ
1	Residual	152.796	185	.826		
	Total	**216.174**	**186**			

a. Dependent Variable: planning services delivery
b. Predictors: (Constant), current development control frameworks

The table above shows that $F_{(1; 186)} = 76.736$ and the p-value for the model fit was 0.00. This implies that the regression model was significant. Therefore, in terms of the proposed hypothesis, the decision was to reject the null hypothesis and concluded that for an organisation to improve its planning service delivery, there is need for extensive alteration and development of its current development control frameworks.

The section focused on researcher validation on two development control models on the topic of using e-development control methods to carry out urban development control. Data was divided into training and testing sets and cross-validation was used to ensure the model's performance was constant across various subsets of data. Outcome's interpretation was used to interpret the model's performance outcomes. In the following section, the study summarises, concludes, recommends and suggests future research based on these findings.

CONCLUSION AND RECOMMENDATIONS

The study's focus was on assessing the feasibility of utilising the e-development control process in tracking urban plans with a bid to develop an e-development control model. This main research objective was achieved by identifying the underlying frameworks used for developments, evaluating the current development control practices and assessing the current methodologies used for development control process in Mvurwi. For purposes of achieving this objective, a mixed methods approach was employed. The section offers study summary, conclusions are and recommendations.

The first research objective focused on identifying the underlying frameworks for development plans in Mvurwi Town. Consequent to identifying the underlying frameworks for development plans in Mvurwi Town, the findings revealed that their development control frameworks being used in development Mvurwi Town. In terms documentary review, the research found that there were the MTC's 1992 Local Plan, environmental laws and rules. The Constitution of Zimbabwe 2013 Amendment (No 20) recognises devolution and decentralisation of state power and provides MTC constitutional protection. The Urban Councils Act governs the council formation and operation and urban settlements, covering estate development, housing provision and construction. The Housing Standards and Control Act and Model Building By-Laws provide the framework for councils to provide services such as housing, street lighting, sanitation, education and health. The Regional and Town Country Planning Act (1976 Revised) governs spatial planning, focussing on preservation and enhancement of the natural environment, the promotion of health, safety, convenience, general welfare and the efficiency and economy of the development process.

The research objective focussed on evaluating current development control practices in Mvurwi Town. It focused on evaluating the current development control practices and review of register for change of use applications from 2010 to 2022. The aim of the exercise was to evaluate volume, scope and nature of applications handled by the MTC and assess how well

development control frameworks were responding to urbanisation trends. The development control practices were not all that effective as mentioned by the responses from the key informants. The council lacks effective development control practices and the study noted that the introduction of modern technology is of paramount importance.

The results show that current development control frameworks and planning services delivery positively correlate with each other (r =0.541, p of 0.000 significant at the 0.05 level). This shows that improved use of current development control frameworks is a great way to ensure that improved planning services delivery in Mvurwi Town.

For achieving the first research objective, the ensuing proposed hypotheses were tested:

- H_0: Current development control frameworks is independent of planning services delivery.
- H_1: Current development control frameworks is dependent on planning services delivery.

Linear regression was employed in a bid to establish the relationship between current development control frameworks and planning services delivery in line with the hypotheses. From the analysis, it was established that 29.3% of planning services delivery is affected directly by development control methodologies frameworks. This means that the remaining 70.7% were explained by other variables. To evaluate the above regression model validity, the ANOVA model fit test was performed and the results implied that the regression model was significant. Therefore, in terms of the proposed hypothesis, the null hypothesis was rejected, hence the conclusion that planning services delivery is dependent on current development control frameworks. Six professional officials were interviewed by the study to conduct a critical evaluation of the current planning practices in Mvurwi Town. The interviews focused on development control frameworks brought on by these processes. Different responses were proffered by active planners to the topic on the details and content included in local plans. Some of

the planners were against the uniformity and overly generalised frameworks, making them unsuitable for many types of scenarios. The third group believed that conventional planning frameworks and could not meet the demands of contemporary society.

The six interviewed planners agreed that the current local plan was intended exclusively for formal settings, but they appreciated the informal sector's roles and recommended strategies and tactics to accommodate it. They also proposed eliminating the phrase "not permitted" from LPs and other government officials. One planner argued that the LP was heavily inclined towards colonial principles and served to advance NIMBYism[4]. The purpose of the participation conversations was to learn how planners assessed the importance and scope of consultations and information sharing. The rating public consultations by majority of planners reflected insufficiency, suggesting the need for a more collaborative planning process be made by holding public meetings and polling the public through questionnaires. During the early stages of planning, surveys were done and were more than sufficient. The Mvurwi Town planners agreed that using GIS and computer-aided planning systems was a good idea. Technology would make it easier to update plans and spatial data, provide clearer visualisation tools, improve spatial analysis and data manipulation tools, strengthen local planners' connections to other experts and make data collecting simpler.

The research objective focussed on the e-development control model in Mvurwi Town. The study in the development of an e-development control model came up with two models which will cater for the development control practices. The first model comprises artisans that are key in the development control and key personnel that play a pivotal role in development control. Notwithstanding the artesian module, the database is linked to

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[4] NIMBY is shortcut for Not In My Backyard

the main development control facets, namely plan approval and building inspections.

The study produced the plan approval model where plans are approved online with physical copies submission from the initial stage of submission to the fifth final stage. In the model, the applicant is notified if the plan has been accepted or rejected and the reason for rejection is stated.

Under the building inspection model, the applicant now has a simple way of booking an inspection, indicating the name of the artisan at each level of inspection and the one who booked and the inspector.

In addition to the above, there is also the module where one can also locate the position of the property on map server.

The second model the study developed is the interactive dashboard which can give information to the both the local authority and the beneficiary. The model is an online system that one can search using the stand number and all the information of the user will come out, from the stand number, location, coordinates and level of development of the property.

The study concludes on development of an e-development model that explored the nature and level of association of geoinformatics in planning and enhanced development control practices taking place in Mvurwi Town. Key informant interview participants were all impressed by the facilitative role of geoinformatics as it had given them the opportunity to test the use of technology in planning regarding their own area.

Overall, the research is expected to make substantial contribution to the body of knowledge regarding development control model innovation and promote growth in various local authorities. This knowledge is of importance to local authority property developers who may want to review their development control practices and development control methods as well, to align them to the improvement of local authority control of development performance. Particularly to the local authority,

this study contributes by shedding light on the importance of having these organisations adopting and implementing e-development control model in line with the NDS1. The findings of the study make contributions to extant literature regarding e-planning and development control model innovation and effective planning services for both local authority and private developers. Lastly, the recommendations derived from the findings will help the local authority and other interest groups in innovation e-planning and development control.

For Zimbabwe local authorities to achieve efficiency and effective in development control, it needs to embrace the use of technology in all planning service delivery. The first measure is to introduce the use of spatial data infrastructure in all local authorities at local level.

As highlighted in this study, to improve decision-making, quality development control should be put in place for all local authorities as this will enhance the issues to do with transparency, innovative, integrity and good sound corporate governance. For the e-development model to be more effective, there is also need to include other departments like finance and audit to have a complete audit of council operations.

REFERENCES

Abramova, T. V. *et al.* (2018). *Cognitive Systems for Monitoring and Forecasting the Scientific and Technological Development of the State*. Moscow: Red Square Scientific, Ltd.

Ackerman, B. *et al.* (2019). Implementing Statistical Methods for Generalising Randomised Trial Findings to a Target Population. *Addictive Behaviors*, *94*, 124-132.

Adabre, M. A. and Chan, A.P. (2019). Critical Success Factors (CSFs) for Sustainable Affordable Housing. *Building and Environment*, *156*, 203-214.

Agyemang, F. S. and Morrison, N. (2018). Recognising the Barriers to Securing Affordable Housing through the Land Use Planning System in Sub-Saharan Africa: A Perspective from Ghana. *Urban Studies*, *55*(12), 2640-2659.

Gao, J., Zhao, Y., Li, L. and Deebhijarn, S. (2021). Feasibility Analysis Model of Transformation from Real Economy to Virtual Economy Based on Association Rule Algorithm. *Mobile Information Systems*, *2021*, 1-9.

García, P. Q., Sanabria, J. G. and Ruiz, J. A. C. (2019). The Role of Maritime Spatial Planning on the Advance of Blue Energy in the European Union. *Marine Policy*, *99*, 123-131.

Geda, A. (2019). The Historical *Origin of the African Economic Crisis: From Colonialism to China.* Cambridge: Cambridge Scholars Publishing.

Govindan, K. and Bouzon, M. (2018). From a Literature Review to a Multi-Perspective Framework for Reverse Logistics Barriers and Drivers. *Journal of Cleaner Production*, *187*, 318-337.

Hong, J. L. *et al.* (2018). Generalising Randomised Clinical Trial Results: Implementation and Challenges Related to Missing Data in the Target Population. *American Journal of Epidemiology*, *187*(4), 817-827.

Jain, M., Korzhenevych, A. and Pallagst, K. (2019). Assessing Growth Management Strategy: A Case Study of the Largest Rural-Urban Region in India. *Land Use Policy*, *81*, 1-12.

Kithiia, J. and Majambo, G. (2020). Motion But No Speed: Colonial to Post-Colonial Status of Water and Sanitation Service Provision in Mombasa City. *Cities*, *107*, 102867.

Kumar, H. *et al.* (2020). Moving Towards Smart Cities: Solutions that Lead to the Smart City Transformation Framework. *Technological Forecasting and Social Change*, *153*, 119281.

Losavio, M. M. *et al.* (2018). The Internet of Things and the Smart City: Legal challenges with Digital Forensics, Privacy and Security. *Security and Privacy, 1*(3), e23.

Mararike, M. (2019). Zimbabwe Economic Sanctions and Post-Colonial Hangover: A Critique of Zimbabwe Democracy Economic Recovery Act (ZDERA)-2001 a2018. *Int'l J. Soc. Sci. Stud.*, *7*, 28.

Matamanda, A. R. (2020). Battling the informal Settlement Challenge through Sustainable City Framework: Experiences and Lessons from Harare, Zimbabwe. *Development Southern Africa, 37*(2), 217-231.

Mbiba, B. (2019). Planning Scholarship and the Fetish About Planning in Southern Africa: The Case of Zimbabwe's Operation Murambatsvina. *International Planning Studies, 24*(2), 97-109.

Memunatu, A. I. (2015). Effectiveness of Development Control in Regulating Urban Housing in Ghana: A Case Study of Sagnarigu *District* (Doctoral dissertation, Doctoral dissertation, Department of Planning, Kwame Nkrumah University of Science and Technology, Kumasi).

Minyoi, M. K. (2019). The Historiography of Town Planning and Its Shifting Paradigms in Sub-Saharan Africa. *Learning Cities, Town Planning and the Creation of Livelihoods*, 1-32

Mironga, A. and Namilonga, C. (2021). The Impact of Zimbabwe's Constitutionalisation of Local Governance on Strengthening Citizen Participation and Good Governance. *International Journal of Scientific and Research Publications*, *11*(10), 357-364.

Mlambo, D. N. *et al.* (2019). Corruption and its Implications for Development and Good Governance: A Perspective from Post-colonial Africa. *Journal of Economics and Behavioral Studies*, *11*(1 (J)), 39-47.

Montella, A. *et al.* (2019). Development and Evaluation of a Web-Based Software for Crash Data Collection, Processing and Analysis. *Accident Analysis and Prevention*, *130*, 108-116.

Moore, S. A. *et al.* (2018). Undermining Methodological Nationalism: Cosmopolitan Analysis and Visualisation of the North American Hazardous Waste Trade. *Environment and Planning Economy and Space*, *50*(8), 1558-1579.

Moyo, M. and Motsi, R. (2023). Devolution in Zimbabwe's 'Second Republic': A Myth or Reality? *Making Politics in Zimbabwe's Second Republic: The Formative Project by Emmerson Mnangagwa*, 143-167. Cham: Springer Nature Switzerland.

Muchadenyika, D. (2015). Land for Housing: A Political Resource–Reflections from Zimbabwe's Urban Areas. *Journal of Southern African Studies*, *41*(6), 1219-1238.

Muchadenyika, D. (2020). *Seeking Urban Transformation: Alternative Urban Futures in Zimbabwe*. Harare: Weaver Press.

Musakwa, W. 2017. Perspectives on Geospatial Information Science Education: An Example of Urban Planners in Southern Africa. *Geo-Spatial Information Science*, *20*(2), 201-208.

Musavengane, R. (2018). Toward Pro-Poor Local Economic Development in Zimbabwe: The Role of Pro-Poor Tourism. *African Journal of Hospitality, Tourism and Leisure*, *7*(1), 1-14.

Mwaura, O. K. and Odera, P. A. (2021). Monitoring Spatio-Temporal Compliance of Urban Development Plans Using GIS and Remote Sensing in Nairobi City County, Kenya. *Ghana Journal of Geography*, *13*(3).

Nascimento, D. L. M. *et al.* (2019). Exploring Industry 4.0 Technologies to Enable Circular Economy Practices in a Manufacturing Context: A Business Model Proposal. *Journal of Manufacturing Technology Management*, *30*(3), 607-627.

Nawari, N. O. and Ravindran, S. (2019). Blockchain Technology and BIM Process: Review and Potential Applications. *J. Inf. Technol. Constr.*, *24*(12), 209-238.

Nielsen, B. F., Baer, D. and Lindkvist, C. (2019). Identifying and Supporting Exploratory and Exploitative Models of Innovation in Municipal Urban Planning; Key Challenges from Seven Norwegian Energy Ambitious Neighborhood Pilots. *Technological Forecasting and Social Change*, *142*, 142-153.

Nieuwenhuis, E. *et al.* (2021). Towards the Integrated Management of Urban Water Systems: Conceptualising Integration and its Uncertainties. *Journal of Cleaner Production*, *280*, 124977.

Njoh, A. J. (2015). *French Urbanism in Foreign Lands*. London: Springer.

Nyadombo, V. V. (2018). Effectiveness of Development Control Mechanisms Used by Local Authorities to Control Illegal Settlements: A Case Study of Harare City Crowborough Farm Paddock 27 invasion. Available online: https://cris.library.msu.ac.zw/handle/11408/3704.

Olszewska, A. A. *et al.* (2018). What Makes a Landscape Contemplative? *Environment and Planning B: Urban Analytics and City Science*, *45*(1), 7-25.

Oluwatayo, I. B., Omowunmi, T. and Ojo, A. O. (2019). Land Acquisition and Use in Nigeria: Implications for Sustainable Food and Livelihood Security. Loures, L. (Ed.). *Land use: Assessing the Past, Envisioning the Future*. BoD– Books on Demand, 91-110.

Omunga, P. (2020). Spatial Planning and Development Strategies in Dar es Salaam City. In: Alakshendra, A. (eds.). *The Routledge Handbook of Planning Megacities in the Global South*, 91-104. London: Routledge.

Pan, H., Kwak, Y. and Deal, B. (2022). Participatory Development of Planning Support Systems to Improve Empowerment and Localisation. *Journal of Urban Technology*, *29*(2), 33-54.

Pantić, M., Miljković, J. Ž. and Milijić, S. (2019). Land Use and Building Regulations: The Case of Spatial Plans for Protected Natural Areas (Serbia). *Facta Universitatis, Series: Architecture and Civil Engineering*, *17*(2), 173-187.

Peter, L. L. and Yang, Y. (2019). Urban Planning Historical Review of Master Plans and the Way Towards a Sustainable City: Dar es Salaam, Tanzania. *Frontiers of Architectural Research*, *8*(3), 359-377.

Prasad, S., Zakaria, R. and Altay, N. (2018). Big Data In Humanitarian Supply Chain Networks: A Resource Dependence Perspective. *Annals of Operations Research*, *270*, 383-413.

Rhodes, C. (2017). Discover More about Zimbabwe Related Topics. *Religion*, *6*(84.1), 69-2.

Rudolf, S. C. and Grădinaru, S. R. (2019). The Quality and Implementation of Local Plans: An Integrated Evaluation. *Environment and Planning B: Urban Analytics and City Science*, *46*(5), 880-896.

Rus, K., Kilar, V. and Koren, D. (2018). Resilience Assessment of Complex Urban Systems to Natural Disasters: A New Literature Review. *International Journal of Disaster Risk Reduction*, *31*, 311-330.

Ryan, L. and D'Angelo, A. (2018). Changing Times: Migrants' Social Network Analysis and the Challenges of Longitudinal Research. *Social Networks*, *53*, 148-158.

Saeed, S. *et al.* (2019). Analysis of Software Development Methodologies. *International Journal of Computing and Digital Systems*, *8*(5), 446-460.

Salter, K., Parker, G. and Wargent, M. (2023). Localism and the Will to Housing: Neighbourhood Development Plans and their Role in Local Housing Site Delivery in England. *Planning Practice and Research*, *38*(2), 253-273.

Sauer, J. and Stewart, K. (2022). Geographic Information Science and the United States Opioid Overdose Crisis: A Scoping Review of Methods, Scales and Application Areas. *Social Science and Medicine*, Vol??? No. ??, 115525.

Scerbo, M.W. (2018). Theoretical Perspectives on Adaptive Automation. In: Parasuraman, R., & Mouloua, M. (Eds.). *Automation and Human Performance: Theory and Applications*, 37-63. London: CRC Press.

Shonhe, T. (2018). The Political Economy of Agricultural Commercialisation in Zimbabwe. Available online: https://www.cabidigitallibrary.org/doi/full/10.5555/201 93145055

Stender, M. and Walter, A. (2019). The Role of Social Sustainability in Building Assessment. *Building Research and Information*, *47*(5), 598-610.

Swinkels, R. *et al* (2019). Analysis of Spatial Patterns of Settlement, Internal Migration and Welfare Inequality in Zimbabwe. Available online: https://d1wqtxts1xzle7.cloudfront.net/71051209/Analysi s-of-Spatial-Patterns-of-Settlement-Internal-Migration-and-Welfare-Inequality-in-Zimbabwe-libre.pdf?1633220177=&response-content-disposition=inline%3B+filename%3DAnalysis_of_Spatial_P atterns_of_Settleme.pdf&Expires=1715936562&Signature =UplndeiVtJ--GIGrKzJF7PxtmIM1cUzVfLq925Xwb8QemnFDOHnN3h5nz NujB85WCrzoKmtwTA4rbSGmPYlFP1MATp8ijdWvaGhaD2 FYUuGwcJymQVjRGgZ-cf-fS9U4-vQUZwnu5uD8Y4it9TY35iU~xag55bmfziIcCxkn-3tmiB~4~cPp5OnWWUN5b7CciG~DwYNVYRGiN3d5fP37H 6QfXkCQGWclfkdd3jhcvqOm4ZoZpUc6q-mDtv4~0Tjzf-fBJntCA76TnmrW29JocK1cMyl0M4588rkxb8WHrlQvgr4J ZXN4YgXHv-cUUIc2ZCdexjaSzvp85uxXSx-~FQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

Testa, S. *et al.* (2019). Spatial Structure Affects Phage Efficacy in Infecting Dual-strain Biofilms of Pseudomonas Aeruginosa. *Communications Biology*, *2*(1), 405.

Tomor, Z. *et al.* (2019). Smart Governance for Sustainable Cities: Findings from a Systematic Literature Review. *Journal of Urban Technology*, *26*(4), 3-27.

Treharne, G. J. *et al.* Perspectives on Expertise in Teaching about Transgender Healthcare: A Focus Group Study with Health Professional Programme Teaching Staff and Transgender Community Members. *International Journal of Transgender Health*, *23*(3), 334-354.

Tribe, K. (2018). The Colonial Office and British Development Economics, 1940–60. *History of Political Economy*, *50*(S1), 97-113.

Vitkovic, N. *et al.* (2018). Software Framework for the Creation and Application of Personalised Bone and Plate Implant Geometrical Models. *Journal of Healthcare Engineering*, *2018*, 1-11.

Vlogman, I. (2023). Cycling the Province: An inquiry into the Social Construction of the Future. MSc Dissertation. Available online: https://frw.studenttheses.ub.rug.nl/4122/

Wang, X. *et al.* (2020). Convergence of Edge Computing and Deep Learning: A Comprehensive Survey. *IEEE Communications Surveys and Tutorials*, *22*(2), 869-904.

Wellmann, T. *et al.* (2020). Remote Sensing in Urban Planning: Contributions Towards Ecologically Sound Policies? *Landscape and Urban Planning*, *204*, 103921.

Wolter, L. (2018). The Feeling and Perception of Using Analog and Digital Task Management Tools within Agile Development. Available online: https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1480091&dswid=7662

Yeh, H. (2017). The Effects of Successful ICT-based Smart City Services: From Citizens' Perspectives. *Government Information Quarterly*, *34*(3), 556-565.

Yigitcanlar, T. (2018). Smart City Policies Revisited: Considerations for a Truly Smart and Sustainable Urbanism Practice. *World Technopolis Review*, *7*(2), 97-112.

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The source being an online Newspaper article

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